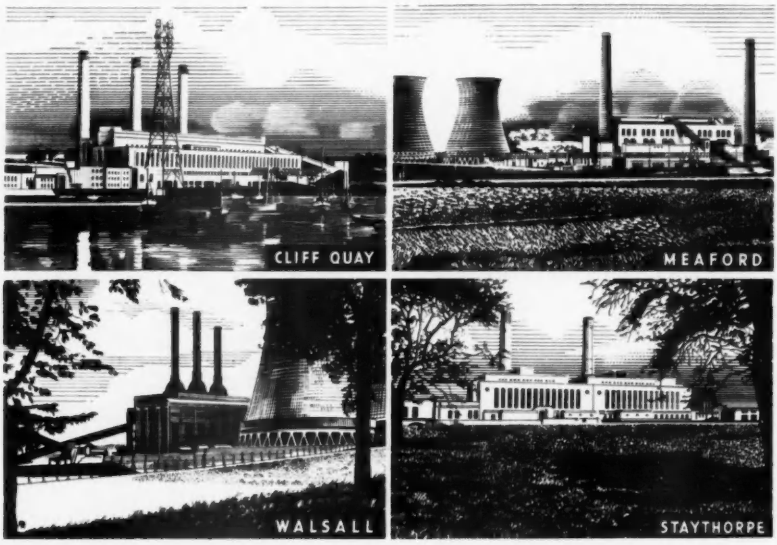
ELECTRICAL TIMES

THURSDAY
15 FEB.
1951
SIXPENCE

THE POWER OF BRITAIN



5 OUT OF 6

Of the six new Power Stations of the British Electricity Authority opened since the War the four illustrated are equipped with Babcock & Wilcox boilers. The fifth is Kingston-upon-Thames, the boilers for which were built at our Renfrew Works for The Stirling Boiler Company Limited.

BABCOCK

STEAM RAISING PLANT

BABCOCK & WILCOX LIMITED

Engineers & Contractors · BABCOCK HOUSE, FARRINGDON STREET, LONDON, E.C.4

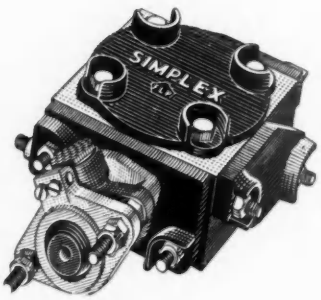
HERE IS THE

NEW

plug-in flameproof

lighting FLP system

(Patent applied for)



BUXTON CERT. NO. 2496 & 2497

Complying fully with B.S.S. 229 and 889, the Simplex 'Antiflam' lighting system has been specially designed for use in mines where certified flameproof apparatus is required. It is suitable for use underground in roadways, pumphouses, sub-stations and stables

This new range is so flexible that extensions or reductions can easily be made in the minimum of time, and cut lengths of cable may be made off and sealed on the surface

MADE BY THE HOUSE OF **Simplex**

Equivalent non-flameproof system available

Write for further details: **Simplex Electric Company Limited Oldbury Birmingham and Branches**

A TI COMPANY

LIGHT—DURING POWER CUTS!

NIFE *emergency lighting equipment*

ALWAYS READY *for immediate use*

INSTALL NIFE NOW!

The perfect answer to power cuts is Nife alkaline battery emergency lighting. Made principally of steel, a Nife battery has an almost inert electrolyte, so there is no deterioration or self-discharge while the battery is 'standing by'. It is always ready for immediate use the moment your lights fail.

There is equipment to meet every need, from a hand-lamp to automatic emergency lighting and power plants which will provide lighting in key points only, or complete protection for a large industrial plant. Write for further details now.

NIFE

EMERGENCY LIGHTING EQUIPMENT
WITH THE STEEL BATTERY

N36

NIFE BATTERIES • REDDITCH • WORCESTERSHIRE

A

Electrical Insulation

MICA

Washers
Plates
Commutator Segments
Stampings
Stove Plates
Heater Strips,
etc.

MICANITE

Mouldings, Commutator Vee Rings, Tubes, Covered Bars, Commutator Segments, Heater Strips, Sheet Material in Moulding, Flexible, Heat Resisting and Commutator Qualities, etc.

BAKELITE

Tubes
Bushes
Bobbins
Washers
Stampings
Panels
Covered Bars,
etc.

Manufactured by

EAST LONDON MICA WORKS

RINGWOOD ROAD, WALTHAMSTOW, LONDON, E.17

'Phone: KEYstone 4254 *Telegrams: Elmicmer, Easphone, London*

ANNOUNCING

MODEL NO. **N.1600**

for SPEED INFORMATION and 3-WAY PROTECTION of CASH RECEIVED

A FOUR TOTAL RECEIPTING MACHINE

Providing 3 identical, non-carbon printed records of receipts on

1. The Customer's Account
2. The Receipt Posting Stub
3. The Locked-in Audit Record

National

ALL TOTALS UNDER LOCK & KEY

For details and demonstrations please write or phone
THE NATIONAL CASH REGISTER COMPANY LTD.
206 Marylebone Rd., London, N.W.1. Paddington 7070

THE STEEL COVERED HEATER WITH

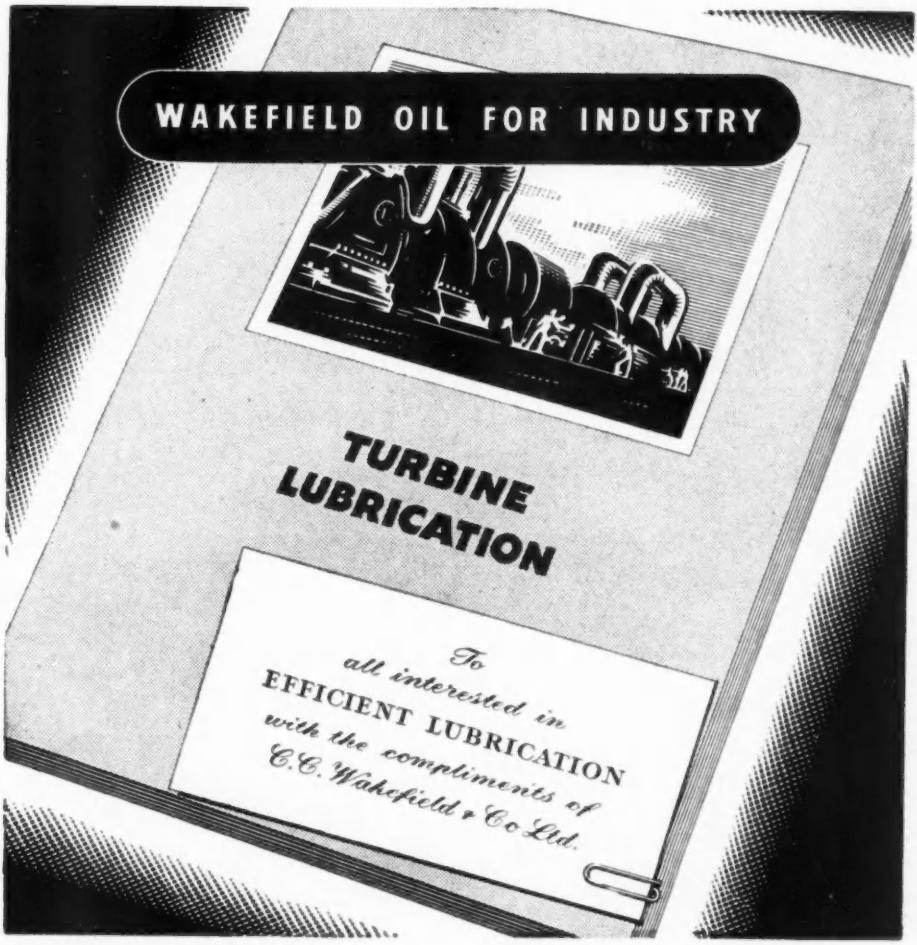
100

USES

IN its variety of forms, the Cressall steel jacketed unit heater is the solution to most heating problems. Let a Cressall Technical Expert discuss heating with you before you decide. He will be happy to help.

CRESSALL

Registered Trade Name of
THE CRESSALL MANUFACTURING CO., LTD.
Tower Street, Birmingham 19
Telephone: ASTon Cross 2666 (3 lines).
Telegrams: "OHMIC, Birmingham"


WAKEFIELD OIL FOR INDUSTRY
TURBINE LUBRICATION
To all interested in EFFICIENT LUBRICATION with the compliments of C.C. Wakefield & Co Ltd.

"TURBINE LUBRICATION" is a comprehensive manual which deals very thoroughly with such subjects as the selection and care of turbine oils, lubrication systems, hydrogen cooled alternators, operating problems, etc. It will be of considerable interest to buyers and all concerned with the operation and maintenance of turbines. A request to the address below made on your official letter heading or on your business card, will bring you a complimentary copy.

C. C. WAKEFIELD & CO. LTD GROSVENOR STREET • LONDON • W.1

"SCOTTISH"
WELDING CABLES
• Maximum Flexibility
• Tough and Durable
• Resists Molten Splatter
A Welder's job is pretty gruelling. Don't make it any worse. Give him a cable which will stand up to any amount of rough treatment and which won't let him down. In other words give him "Scottish" Welding Cables.
SCOTTISH CABLES LIMITED
DEANSIDE RENFREW SCOTLAND
LONDON OFFICE: MANFIELD HOUSE 376/379 STRAND W.C.2

The MECHANICAL CHARWOMAN

says

"I'll deal with this"

Spring cleaning—and your first full-scale opportunity to promote big sales of Columbus, "The Mechanical Charwoman,"—certainly the biggest gun you ever had for any selling campaign.

The only machine in the world that does all five of the hardest cleaning jobs in the home, and in offices, shops, restaurants, hotels, hospitals, etc.

Sales reports already coming in prove that the enterprising selling of the "Mechanical Charwoman" brings results as sensational as the machine itself.

COLUMBUS

The Mechanical Charwoman

ONE MACHINE with interchangeable units for Scrubbing, Drying, Suction Polishing and Cleaning of all floors and floor coverings, and for Dusting from floor to ceiling.

PRICES from £32 10s. to £58 (plus Purchase Tax) according to requirements.

Individual appliances to do all these jobs would cost around £200. Few of your customers could afford that, but many will be in the market for the "Mechanical Charwoman."

COLUMBUS LTD., Wembley, Middlesex

The Leaders of the Industry. The only organisation specialising in power floor cleaning equipment for every purpose in Industry and the Home.

NALDERS

Indicating & Recording INSTRUMENTS

For QUALITY • ACCURACY • DEPENDABILITY

Illustration is of N.C.S. "Ideal" Power Factor Meter, Round Switchboard Pattern, to B.S. Specification, 360 deg. scale.

Independent of current, voltage frequency or temperature variations met with in commercial practice.

Low voltampere consumption.

Supplied for single phase and polyphase, balanced or unbalanced loads.

Portable Patterns also available.

When instruments are required for balanced load systems they can be arranged to operate from one current transformer if desired.

Nalder-Lipman Patents.

SQUARE PATTERN INSTRUMENTS ALSO SUPPLIED

The up-to-date design, scientific accuracy and practical efficiency of all instruments sold under the N.C.S. Trade Mark guarantee the user's satisfaction.

N.C.S. PRODUCTS include all types of Measuring Instruments, Indicating or Recording, Switchboard or Portable. Also Protective Relays, Synchronisers, Circuit Breakers, etc. Every unit is designed for maximum operating efficiency, reliability and durability, prices being competitive without sacrifice of quality.

Quotations on request.

NALDER BROS. & THOMPSON LTD. DALSTON LANE WORKS

Telephone: Clissold 2365 (3 lines). Telegrams: Occlude, Hack, London. LONDON, E.8

Burco

ELECTRIC WASHBOILER

Cat. No.
E840

DESIGNED FOR LONG TROUBLE-FREE SERVICE

MANUFACTURED BY AN ORGANISATION WHICH CONCENTRATES ON WASHING APPLIANCES

DETAILS PERFECTED TO A HIGH DEGREE

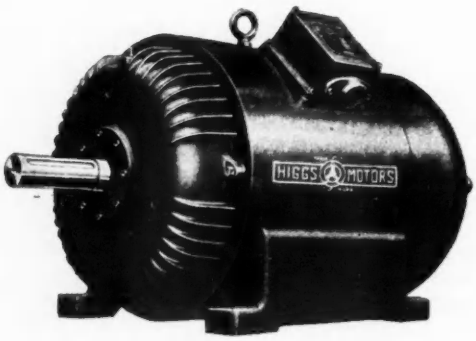
DESIGNED BY SPECIALISTS WHO ARE EXPERTS BY EXPERIENCE

All enquiries to

BURCO LTD

ROSE GROVE · BURNLEY · LANCS

TRADE +
HIGGS MOTORS
CHAIRMAN WALTER F. HIGGS, M.I.E.E. LTD.
BIRMINGHAM 6 — MARK ENGLAND



Specify Totally-enclosed, fan-cooled motors
for consistent reliability in dusty and
dirt-laden situations.

GUARANTEED FOR EVER

**Belfast, Birmingham, Bristol, Dundee, Glasgow, London,
Manchester, Newcastle, Peterborough, Sheffield, Wolverhampton**

TURNRIGHT CONTROLS LTD.
West Hill, Hoddesdon, Hertfordshire
Telephone HODDESDON 3631.

B

Insist on **"GRUBB"**

All Electric

IMMERSION HEATERS

OR

CIRCULATORS

Thermostatically controlled HOT WATER available at all times

Guaranteed for TWO YEARS

LOADINGS available in 2, 3 and 4 kW

IMMERSION HEATERS from 12″ to 42″

CIRCULATORS for soft water areas only Sizes : 16″ to 42″

Write today for price lists, brochures and Trade terms to the sole manufacturers :

GRUBB ENGINEERING COMPANY LIMITED BIRMINGHAM 12

EXPORT ENQUIRIES INVITED

PLASTICS FOR INDUSTRY

Relax! Ekco will mould it — and design it if need be, and make the tools and see to any inserts or wiring. In fact, Ekco will shoulder the whole burden of any thermosetting or thermoplastic problem that comes your way. For a really comprehensive, reliable and economical service, consult our Advisory Service.

EKCO

will mould it

E. K. COLE LTD. (*Plastics Division*) SOUTHEND-ON-SEA

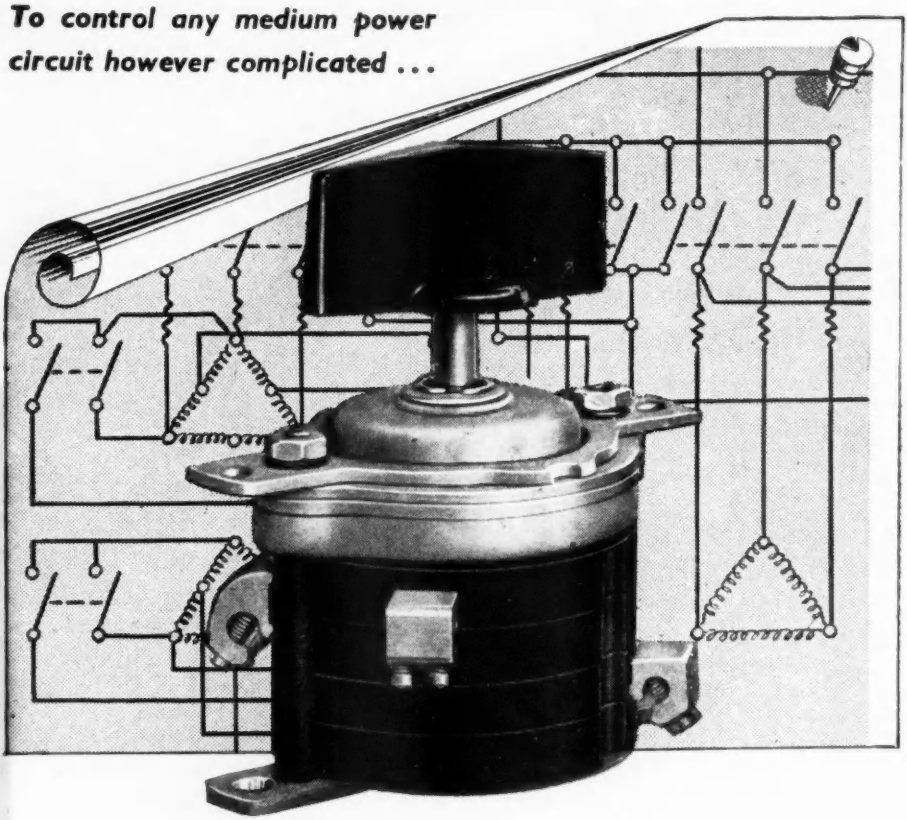
12

REASONS WHY
YOU SHOULD USE
Aluminium
ALLOY CASTINGS

renfrew foundries ltd 2

ease of machining

To control any medium power circuit however complicated . . .



. . . there is a ready-made type of

SANTON ROTARY SWITCH!

SANTON switches operate on a simple rotary movement.

SANTON switches have large, easily accessible terminals, plainly marked.

SANTON switches are available from 10-60 Amps. (180 under special conditions), any number of poles up to six positions—up to 660 volts.

SANTON switches can be delivered promptly and give years of trouble-free service.

Most areas have a SANTON Resident Engineer who will be pleased to call and discuss your switching problems with you. Take the first step today towards simpler, more efficient control.

TRADE MARK: SANTON

Write or phone

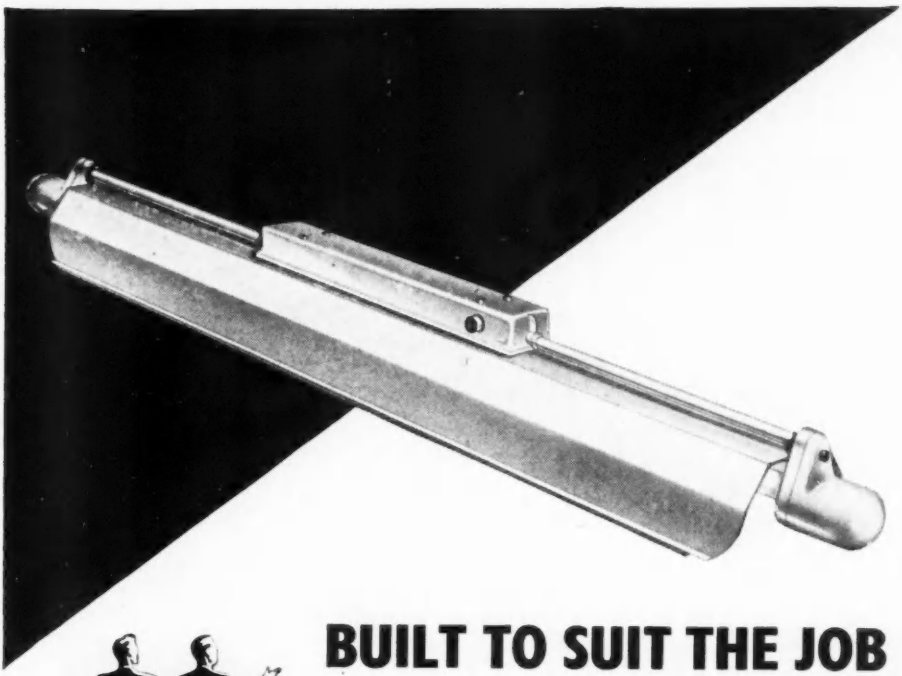
SANTON LTD., NEWPORT, MON. ***Tel. 71711 (10 lines)***

London : Sloane 2158 *Manchester : Central 1394/5*

Birmingham : Midland 6421 *Torquay 7100*

NEWPORT SANTON MON ENG

17161



BUILT TO SUIT THE JOB

DUSTPROOF and VAPOURPROOF fittings must be designed and made to do a job of work, as well as to look good. Judge how well Crompton have tackled this problem at a remarkably attractive price.

SEALING of all contacts and gear from dust or from moisture by suitable gaskets and glands.
PROTECTED ENCLOSURE of control gear, lampholders and contacts in light, strong, non-corrodible die castings.
CLEANING AND MAINTENANCE simplified by finger catch detachability of reflectors.
INTERNAL WIRING protected in heavy galvanised tube
SMOOTH DESIGN avoids crevices or wells to house dirt or moisture.
VITREOUS ENAMEL reflector for long, hard wear under trying conditions.
INSTALLATION easy by chain or conduit suspension.
SERVICE of lamps and starters without dismantling fitting or using tools.
EFFICIENCY 15%—20% higher than older glazing frame designs.
LAMP, Crompton 80 w. 5-ft. fluorescent tubular lamps.
COLOUR white throughout.

There is a Crompton lighting fitting for almost every purpose and a Crompton lighting engineer to help you to get the best from your lighting equipment.

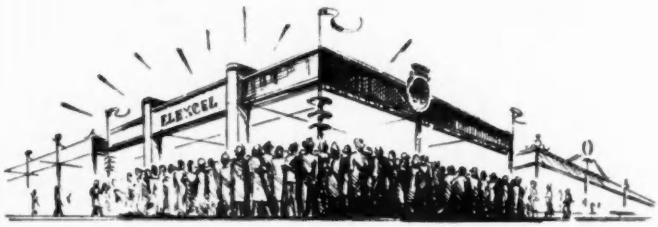
Built to better purpose by

Crompton

BY APPOINTMENT MANUFACTURERS OF ELECTRIC LAMPS TO H.M. THE KING

CROMPTON PARKINSON LTD.,
CROMPTON HOUSE
ALDWYCH . LONDON . W.C.2

At the IDEAL HOME EXHIBITION



that must be

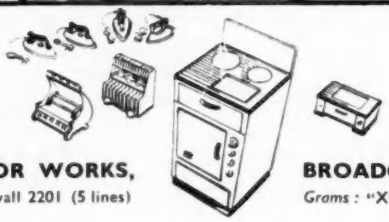
STAND No. 76

in the Grand Hall, Ground Floor, March 6th to 31st

Our stand at this famous exhibition is for your benefit too, and we cordially invite you to visit us. Thousands of housewives looking for the latest in modern household appliances will dwell at the "XCEL" Stand. There, they will be inspired to buy the most up-to-date and best in electrical products—"XCEL."

Are you stocking them.....?

XCEL
ALL BRITISH

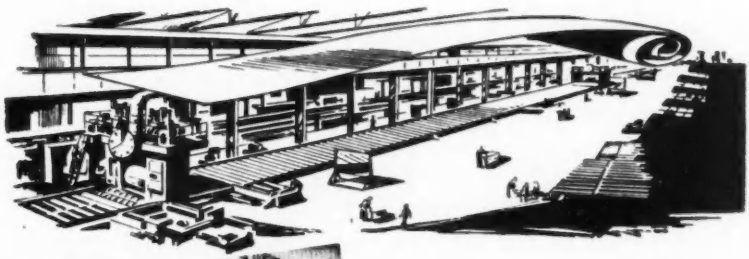


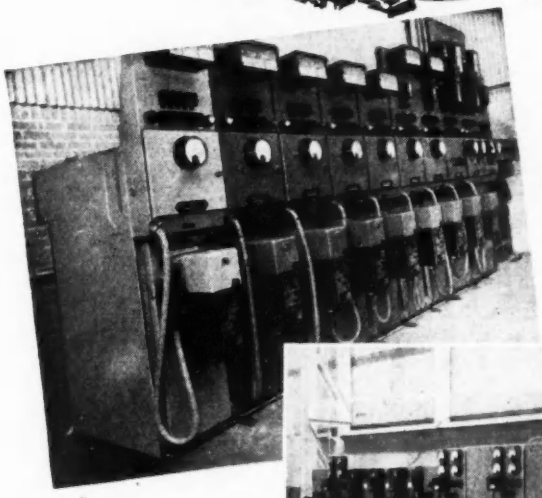
ELEXCEL LTD., VICTOR WORKS, BROADGREEN, LIVERPOOL 14

Phone: Childwall 2201 (5 lines) *Grams:* "XCEL", Liverpool

AN IMPORTANT ADDITION TO BRITISH INDUSTRY—

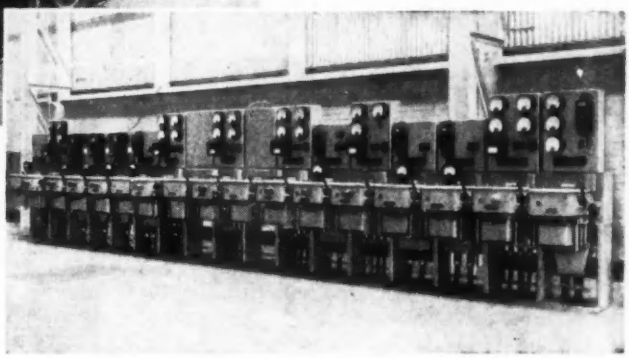
manufacturing **ALUMINIUM**





The illustrations show (above) an impression of the "hot line" at the new Northern Aluminium factory at Newport, Mon. The BV.4 Switchboard (left) and the K4 Switchboard (below) are examples of the numerous installations in the factory.

Photographs by courtesy of the Northern Aluminium Co. Ltd.



'F.P.' SWITCHGEAR

serves every industry

This great new plant employs many switchboards of "Ferguson Pailin" construction. The "BV4" and "K4" types are for service at IIkV and 400 volts respectively. Important industrial undertakings specify "Ferguson Pailin" switchgear—a tribute to its RELIABILITY.

FERGUSON PAILIN LTD.

MEMBER OF THE AEI GROUP OF COMPANIES

Switchgear Specialists

MANCHESTER, 11. ENGLAND

FOR SPANS LIKE THIS AT 275 kV

USE

steel-cored ALUMINIUM CONDUCTOR

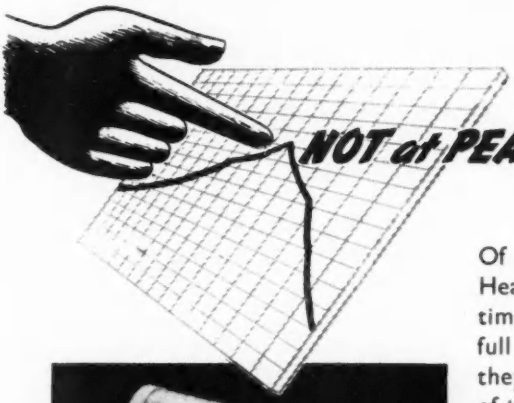
B.I. Callender's

BICC Steel-Cored Aluminium Conductor is being supplied for the British Electricity Authority's new 275 kV Super Grid. The 22½ mile long Staythorpe-Barnby Moor section, comprising 99 towers supporting 1,000 ft. spans, is now under construction by BIC Construction Co. Ltd.

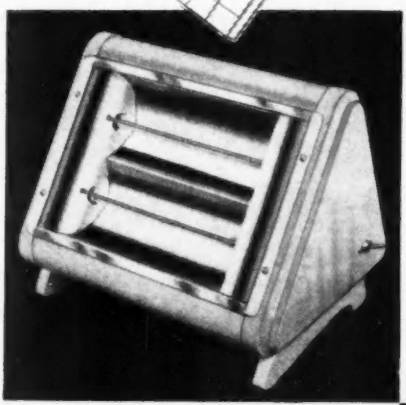
Because of its great tensile strength, lightness and relative high corona limit BICC Steel-Cored Aluminium Conductor has proved suitable for very high voltage lines on transmission systems all over the World.

For inter-connection between overhead lines and sub-stations BICC also supply Impregnated Pressure Cable for voltages up to 275 kV—as illustrated.

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2



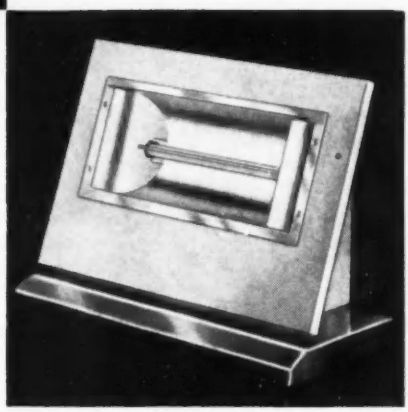
NOT at PEAK periods, PLEASE!



Of course, these two *SPECIAL* Heatraes give of their best at *all* times, but it is obvious that the full measure of their ardour is when they can enjoy their normal ration of 'juice'. Thus, when the Power Station peak is passed, Heatrae "Dandy" and "Pilot" Fires reach their highest peaks of achievement.

They are shining examples of clever design—pleasing both to eye and body comfort, and fully described in Leaflet No. 68 free on request.

Heatrae



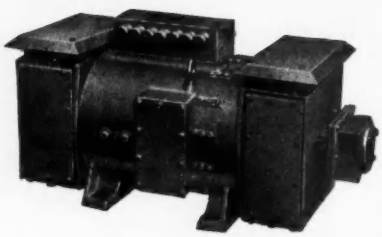
HEATRAE LTD. • NORWICH • NORFOLK

Manufacturers of: Electric Water Heaters, Oil Heaters, Immersion Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Flame-proof Heating Apparatus, Breakfast Cookers, Electric Fires, Food Trolleys, Warming Plates, Air Heaters

QUANTITY PRODUCTION
BRAY
INSULATOR AND REFRACTORY WARE
OF SMALL AUTOMATICALLY MADE ARTICLES TO FINE TOLERANCES WITHOUT THE COSTLY USE OF GRINDING

GEO. BRAY & CO. LTD. LEEDS 2

NEWTON-DERBY
ELECTRICAL EQUIPMENT



2½ kVA Motor Alternator. Drip-proof to 45°. Motor 220 volts D.C. Output 120 volts, 3 phase, 333 cycles per second. Motor includes an automatic constant-speed governor. Weight 450 lb.

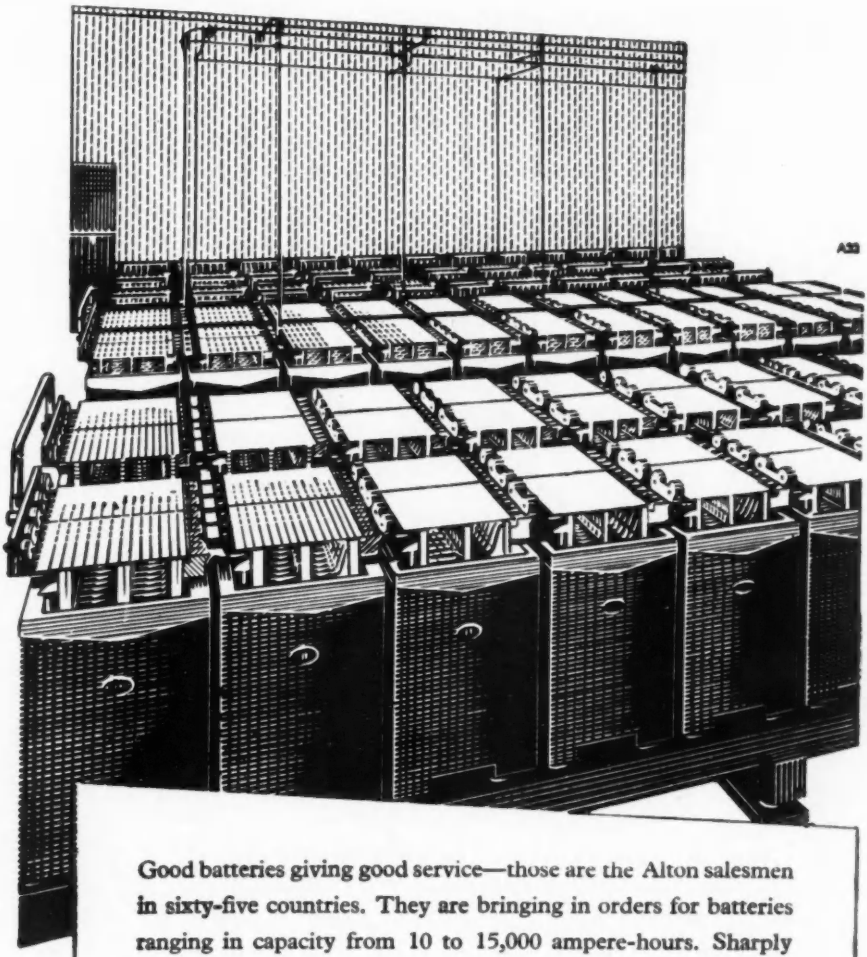
HIGH-FREQUENCY ALTERNATORS

(Send for publication No. 1003)

Also makers of Rotary Transformers and Anode Converters, Wind and Engine-driven Aircraft Generators, High-tension D.C. Generators and Automatic Carbon Pile Voltage Regulators.

NEWTON BROTHERS
(DERBY) LTD.

HEAD OFFICE & WORKS ALFRETON ROAD DERBY
TELEPHONE DERBY 4286 7 TELEGRAMS: DYNAMO, DERBY
LONDON OFFICE IMPERIAL BUILDINGS, 56 KINGSWAY W.C.2



Good batteries giving good service—those are the Alton salesmen in sixty-five countries. They are bringing in orders for batteries ranging in capacity from 10 to 15,000 ampere-hours. Sharply increasing orders: but Alton, long experienced in export, is organised to meet them—with good batteries and firm delivery dates.

ALTON

Alton can also supply renewal plates for all makes of battery, British and Continental

BATTERIES OF MERIT

THE ALTON BATTERY CO. LTD

Alton, Hants. Telephone: Alton 2267 and 2268. Grams: Battery, Alton

HOW GOOD CAN WINDING WIRES BE ?

An improved standard of perfection has been achieved by the production of 'LEWMEX' (Regd.) Synthetic Enamel insulated wires and strips, which have outstanding physical and mechanical properties, extreme flexibility, safe working temperature of 110°C. (continuous operation) and are resistant to oils and varnish solvents

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS, LIMITED
LEYTON, LONDON, E.10.
Incorporating FREDERICK SMITH AND COMPANY
Associated with THE LIVERPOOL ELECTRIC CABLE CO., LTD., AND VACTITE WIRE CO., LTD.

GI

'ENGLISH ELECTRIC' fusegear

Higher Rupturing Capacity 35 MVA

For more than two decades the 'English Electric' High Rupturing Capacity Non-Deteriorating Cartridge Fuse Link has established its supremacy on all types of electrical distribution systems.

Originally rated at 25,000 KVA. rupturing capacity and A.S.T.A. certified for Category of Duty 440AC4 to the 1939 and 1947 editions of BS. 88, recent Short Circuit tests have shown large safety margins.

Now The English Electric Company announce that the complete range of Type 'T' Cartridge Fuse Links has successfully passed A.S.T.A. certifying tests to BS. 88/1947 Category of Duty 440AC5, i.e. 46,000 R.M.S. Symmetrical Prospective Amperes at 440 Volts, corresponding to a rupturing capacity of 35,000 KVA. (35 MVA.).

This proof of higher rupturing capacity is yet further justification for our claim "Install 'English Electric' and be safe."

THE ENGLISH ELECTRIC COMPANY LIMITED

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Fusegear Works, East Lancashire Road, Liverpool, 10

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

Eversheds Tachometers Widely used in Modern British Steelworks

Running Speeds Remotely Shown at Key Points

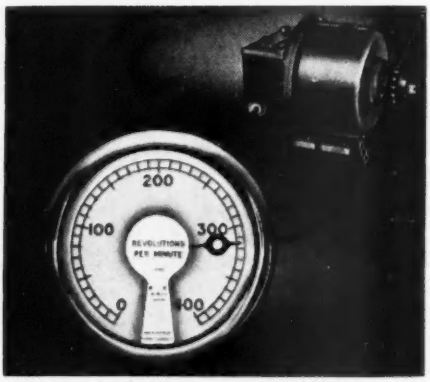
Eversheds Tachometers, which remotely record running speeds of plant, are among the instruments used in the system of centralised control at the famous Hawarden Bridge Steelworks of John Summers and Sons Ltd.

In the hot strip mill, for instance, a tachometer is fitted to each of the five finishing mill motors, to the flying shear drive and to the pinch rolls drive which precedes the finishing mill. The relative speeds of each of these drives is shown on the control desks which are installed in the finishing mill pulpit.

Tachometers are fitted at other key points in the 'pickling lines' where surface scale is removed after hot-rolling; in the cold mills, in trimming, levelling and slitting, and the final stages after annealing. In each case, the installation of an Eversheds Tachometer, connected to a recording dial on a control desk, enables the running speeds of plant to be accurately controlled, and in some cases the speeds of complementary machines to be balanced.

Eversheds Tachometers indicate and record at any necessary distance, speeds and other proportionate quantities, such as the rate of production.

SEND FOR PUBLICATION NO. . . J 224



An Eversheds Electrical Tachometer.

EVERSHED CONTROLS ON A.E.C. DIESEL SETS

An excellent example of the use of Eversheds Controllers is to be found at the A.E.C. generating station at Southall. Sixteen 65 kW diesel electric generating sets have been installed on the ground floor, the switchgear and panels being on a gallery above. To ensure that the engines run at the same speed, each one has an Eversheds Throttle Control slave unit connected to a transmitter situated on the switchgear panel. The actual check is on the kW output, the kW indicator being near the transmitter handle. The switchboard attendant can thus adjust the speed of any engine without leaving his position on the gallery platform.

EVERSHED

PROCESS CONTROLLERS
INDICATORS & RECORDERS
REMOTE CONTROLLERS
MEGGER TESTERS

NEW—THE 'NOFLOTE' CONTROL STORY

Eversheds have produced a new edition of the 'Noflote' Pump Control booklet. This contains, for the first time, complete details of the new sensitive pattern relay units, which are used for operation in connection with relatively clean water. The standard pattern electrodes used for drainage and sewage purposes are also described.

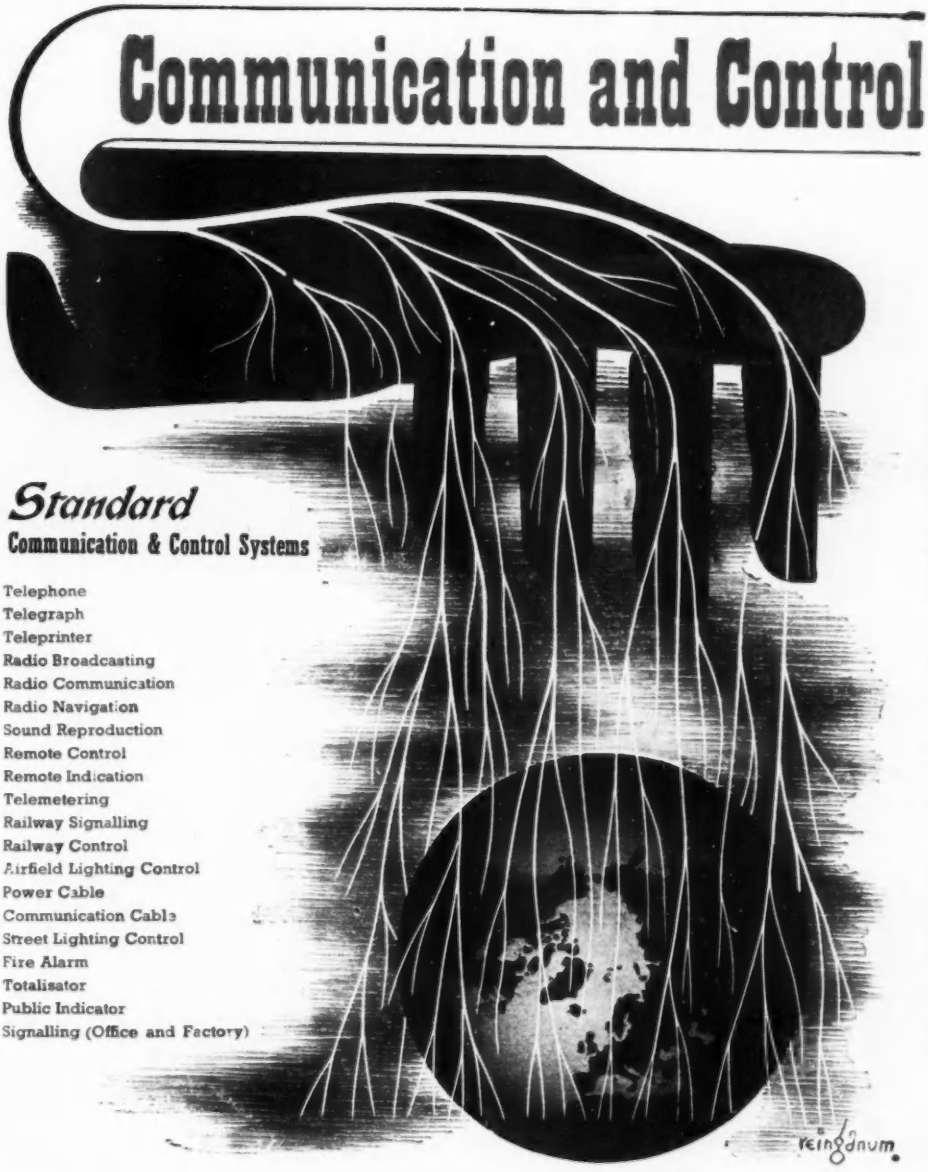
Send for your copy—Publication No. J 234

EVERSHED & VIGNOLES LIMITED, Acton Lane Works · Chiswick · London · W.4

Telephone: Chiswick 3670 · *Telegrams:* Megger, Chisk, London · *Cables:* Megger, London

5/134

Communication and Control



Standard
Communication & Control Systems

Telephone
Telegraph
Teleprinter
Radio Broadcasting
Radio Communication
Radio Navigation
Sound Reproduction
Remote Control
Remote Indication
Telemetering
Railway Signalling
Railway Control
Airfield Lighting Control
Power Cable
Communication Cable
Street Lighting Control
Fire Alarm
Totalisator
Public Indicator
Signalling (Office and Factory)

Standard Telephones and Cables Limited

Telecommunication Engineers : CONNAUGHT HOUSE, 63 ALDWYCH, LONDON, W.C.2

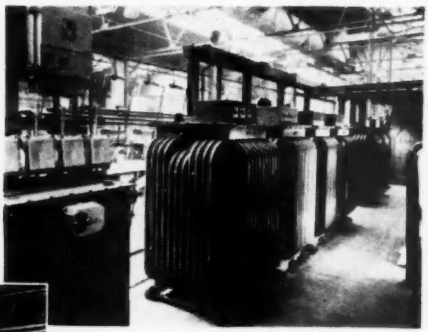
Cairo Karachi Dublin Johannesburg New Delhi Salisbury

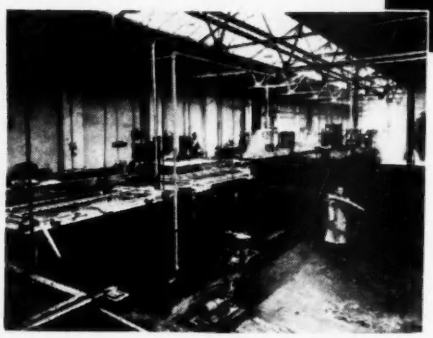
CAR RADIATORS

PLATED

by

Westinghouse oil-immersed plating rectifiers at the Coventry Radiator Co., Ltd., by whose permission these photographs are reproduced.





This is one of the many large installations included in the total output of 4,500,000 amperes which is now being obtained from

WESTINGHOUSE

WESTALITE

PLATING RECTIFIERS

for all

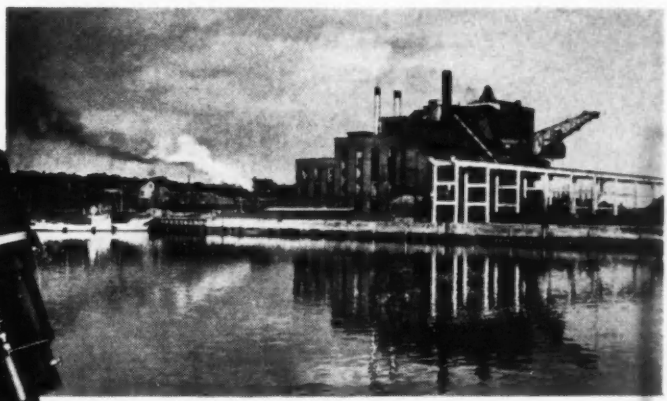
electro-deposition processes

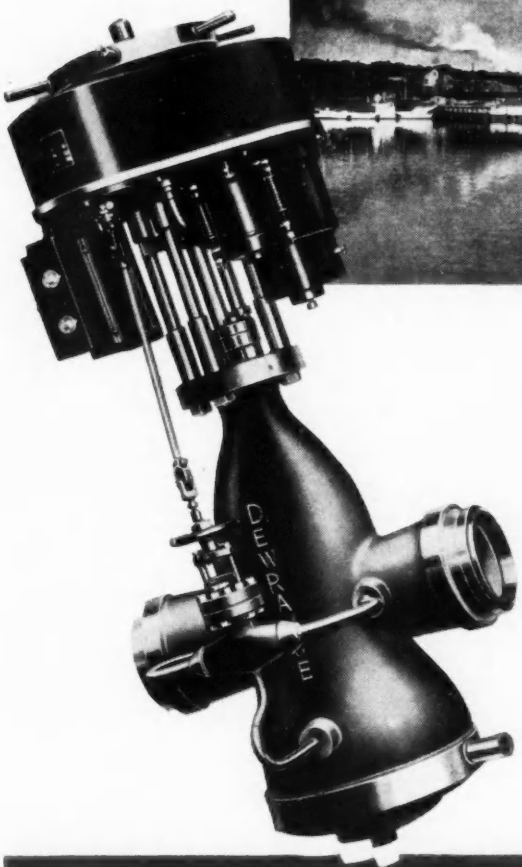
Write for Data Sheet No. 44 to Dept. E.T.4

WESTINGHOUSE BRAKE & SIGNAL CO. LTD.

82, York Way, King's Cross, London, N.1

ESBJERG
POWER STATION DENMARK





Dewrance High Pressure High Temperature Boiler Mountings and Piping Valves are widely known to Engineers the world over for their advanced design to meet present day operating conditions.

Recent [illegible] include the supply of [illegible] Mountings and Valves for Esbjerg Power Station, Denmark, one of the most modern in the world, working at 1,200lb. sq. inch (84 kgs), 905°F (485°C).

DEWRANCE & CO. LTD.

GT. DOVER ST., LONDON, S.E.1. Works LONDON, DUMBARTON & HILLINGTON HOP 1244 (10 Lines)

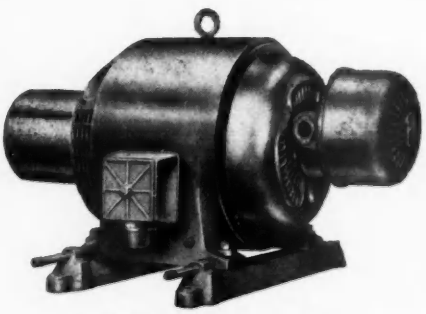
"They're not the cheapest motors you can buy, but they **ARE** *the finest value for your money"*

– *SAYS*

THE PURCHASING OFFICER

It is a well known fact that it is not always the cheapest product which impresses the keen buyer. He looks for something more than mere price . . . the specialist organisation behind the supplier; the service that goes with the product.

That is why you will find BROOK catalogues in his file.



Protected Slip Ring Motor

BROOK MOTORS Ltd

HUDDERSFIELD · ENGLAND

I.HZ.175

A 3-Phase 230 kV
FERRANTI TRANSFORMER
64/64/32 MVA.
115·5/231/10·5 kV.
PRESSURE TESTED AT 530 kV, 50 CYCLES
FERRANTI
LTD
HOLLINWOOD . LANCASHIRE
LONDON OFFICE: KERN HOUSE, KINGSWAY, W.C.2
FT100

C.M.A.-CABLES

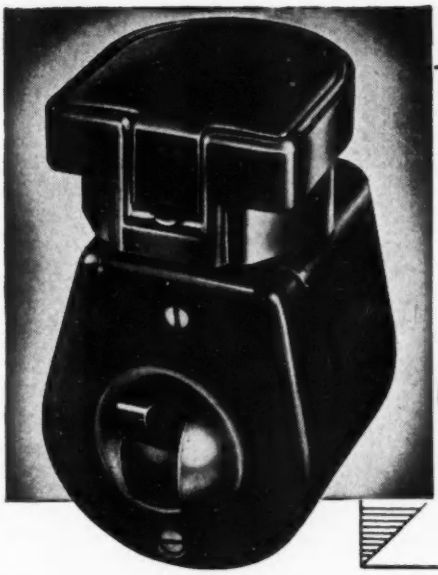
In the air, on sea or on land, all scientific triumphs call for the finest and most reliable equipment.
Therefore when cables are required, always specify

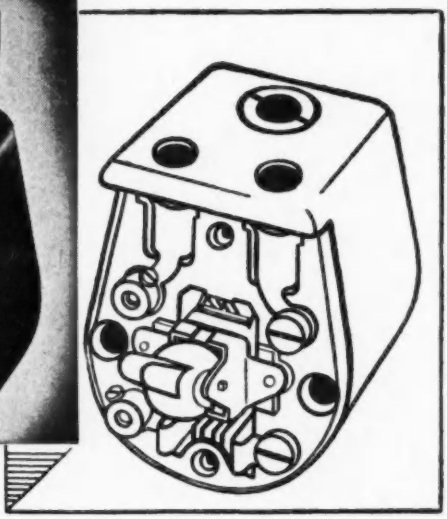
C.M.A.

MEMBERS OF THE C.M.A. & AFFILIATED MANUFACTURERS' ASSOCIATIONS

British Insulated Callender's Cables Ltd
Connollys (Blackley) Limited.
The Craigpark Electric Cable Company Limited.
Crompton Parkinson Limited.
Enfield Cables Limited.
The Edison Swan Electric Company Ltd.
Greengate & Irwell Rubber Company Limited.
W. T. Glover & Company Limited.
W. T. Henley's Telegraph Works Company Limited.
Johnson & Phillips Limited.
Liverpool Electric Cable Company Ltd.
Metropolitan Electric Cable & Construction Co. Ltd.
Pirelli-General Cable Works Limited (The General Electric Co. Ltd.).
Siemens Brothers & Company Limited (Siemens Electric Lamp & Supplies Limited).
St. Helens Cable & Rubber Company Ltd.
Standard Telephones & Cables Limited.
The Telegraph Construction and Maintenance Co. Ltd.

MAINS CABLE MANUFACTURERS ASSOCIATION
MAINS CABLE MANUFACTURERS ASSOCIATION (SUPER-TENSION)
RUBBER & THERMOPLASTIC CABLE MANUFACTURERS ASSOCIATION
Affiliated to
CABLE MAKERS ASSOCIATION
52-54 High Holborn, London, W.C.1. Tel: Holborn 7633





The TEMCO Top-entry Switch Socket solves the problem....

of providing TEMCO quality for the highly competitive installation.

Made in 5-amp. and 15-amp. 2 and 3-pin B.S.S. gauge.

The quick make and break switch for A.C. or D.C. complies with B.S.S.816.

Porcelain base is recessed and provided with knock-outs.

Moulded dolly has no metal insert.

The plug with the automatically adjusted cord grip, is identical with the one used on the more elaborate TEMCO front-entry switch sockets.

WRITE FOR CATALOGUE OF TEMCO ELECTRICAL WIRING ACCESSORIES

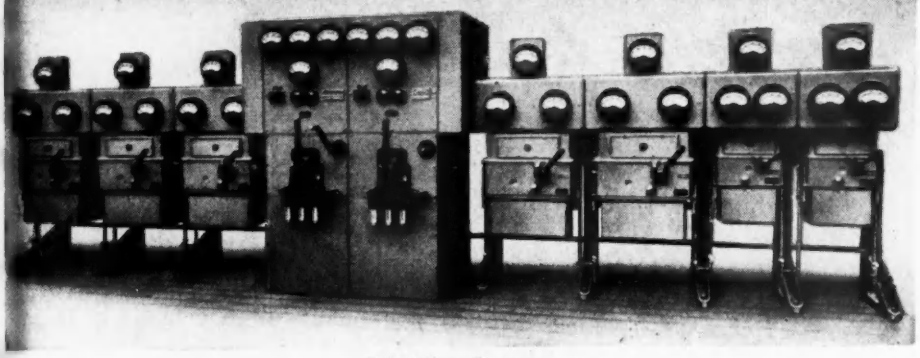
Marketed by: **T.M.C—HARWELL (SALES) LTD**
37 UPPER BERKELEY ST., LONDON W.1 Tel: Paddington 1867-8-9

A Sign of

CONFIDENCE

in the widespread demand for

INCREASED PRODUCTION



We Manufacture:

SWITCHGEAR 50/5,000 Amps. CONTROL GEAR ¼ H.P./5,000 H.P.

May we have your enquiries?

ERSKINE, HEAP & Co LTD

SWITCHGEAR SPECIALISTS

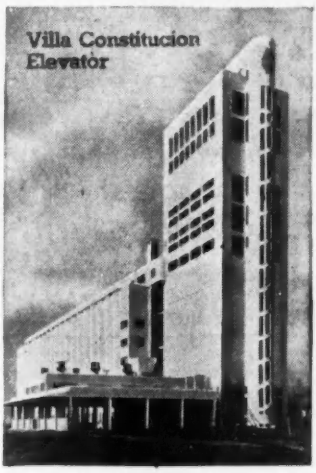
Head Office and Works
BROUGHTON, MANCHESTER (7)

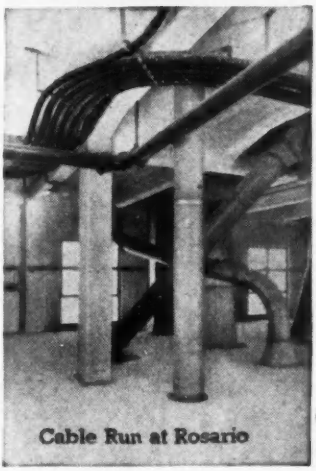
London Office
GRAND BUILDINGS, TRAFALGAR SQ., W.C.2

BRANCH OFFICES AND AGENCIES IN ALL PARTS OF THE WORLD

597

Rosario South Elevator


Villa Constitucion Elevator


Cable Run at Rosario

OVER 142 MILES OF BICC ELECTRIC CABLES

In Argentina's New GRAIN ELEVATORS

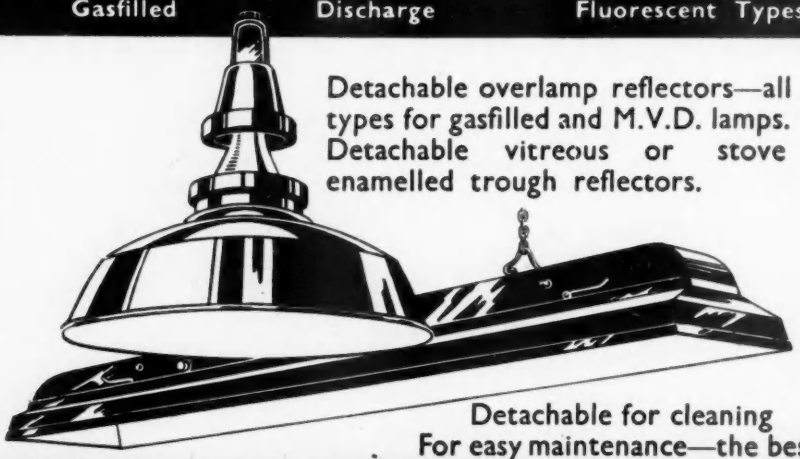
BICC provided 720,000 ft. of V.R.I. and 35,000 ft. of armoured type cables for Argentina's four new grain elevators—over 142 miles in all! These cables supply the power for Conveyors, Loading, Ventilating and Dust Extracting machinery—as well as for Lighting, Signalling and Telephone systems.

The Elevators are at Rosario South, Villa Constitucion Quequen and Ingeniero White. The cables were supplied through our Agents, Messrs. Colson, Brookhouse & Pyne Ltda., of Buenos Aires, and installed by the Anglo-Argentine General Electric Co. Ltd.

B.I. Callender's Cables for Industrial Installations

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

THORLUX INDUSTRIAL LIGHTING EQUIPMENT. Manufacturers of Gasfilled Discharge Fluorescent Types



Detachable overlamp reflectors—all types for gasfilled and M.V.D. lamps. Detachable vitreous or stove enamelled trough reflectors.

Detachable for cleaning
For easy maintenance—the best.

F. W. THORPE LTD. WELBY RD HALL GREEN **BIRMINGHAM 28**

SPRINGFIELD 3318 GRAMS: THORLUX B'HAM

Domestic temperature controls

No. 2—FLEXIBLE-DRIVE
OVEN THERMOSTATS

A "speedo" drive for speedy fitting. Just mount the thermostat and control head, and connect together with the flexible steel cable. As simple as that. No awkward alignment problems, no backlash, and yet the accuracy, stability and reliability of a rod-type thermostat is retained. These unique features of the Sunvic flexible-drive oven thermostat, together with the positive-action switch as used in the famous Simmerstat, mean dependable control throughout a long and useful life. But it costs no more. Fit it to your cookers and modernise them simply and efficiently.

Better feel sure – better fit SUNVIC

Write for Publication TO.10 to:
SUNVIC CONTROLS LTD. SUNVIC HOUSE, ESSEX STREET, STRAND, LONDON, W.C.2
Member of the A.E.I. Group of Companies TAS/SC/256

Saves space

Like an outboard motor, the Alklum Steel-Alkaline Battery packs plenty of power into a small space. Compact and sturdily built to withstand prolonged hard use, quick to recuperate after heavy discharge, the Alklum Battery gives maximum service for minimum maintenance costs.

ALKLUM

STEEL-ALKALINE BATTERY

Britannia Batteries Limited 66 Victoria Street, London, SW1 Telephone: Victoria 9661-2

'AVO' Precision ELECTRICAL TESTING INSTRUMENTS

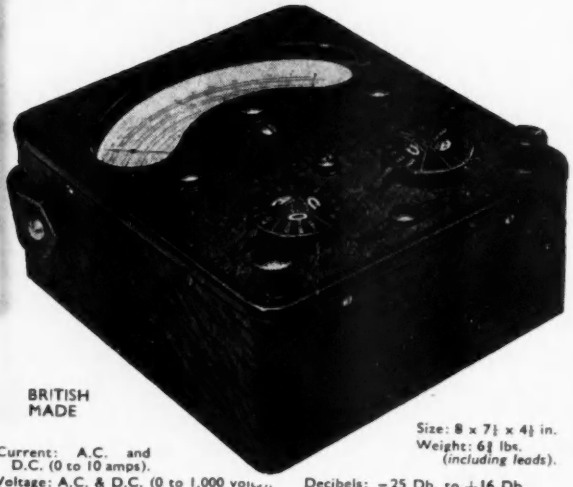
BRITISH MADE

The **Model 40** Universal AVOMETER

A multi-range A.C./D.C. Measuring Instrument of B.S. 1st grade accuracy, providing 40 ranges of readings on a 5 in. hand-calibrated scale. Range selection is by means of two rotary switches, for A.C. and D.C. respectively. A press-button provides an additional range for each value of current and voltage shown on the switch knobs. The total resistance of the meter is 200,000 ohms. An automatic cut-out provides protection against damage through severe overload.
This instrument has been specially designed for the electrical industry.

Current: A.C. and D.C. (0 to 12 amps).
Voltage: A.C. and D.C. (0 to 1,200 volts).
Resistance: Up to 1 megohm.

Size: 8 ins. x 7¾ ins. x 4½ ins. Weight: 6¼ lbs. (including leads)
Leather Carrying Case available if required.



BRITISH MADE

The **Model 7** Universal AVOMETER

This Instrument provides 50 ranges of readings on a 5-in. hand-calibrated scale. Range selection is by means of two rotary switches, for A.C. and D.C. respectively. A press-button provides an additional range for each value of current and voltage shown on the switch knobs. Current consumption is 1 mA or 2 mA at full-scale deflection, according to whether the press-button is used or not. The total resistance of the meter is 500,000 ohms. An automatic cut-out provides protection against damage through severe overload.

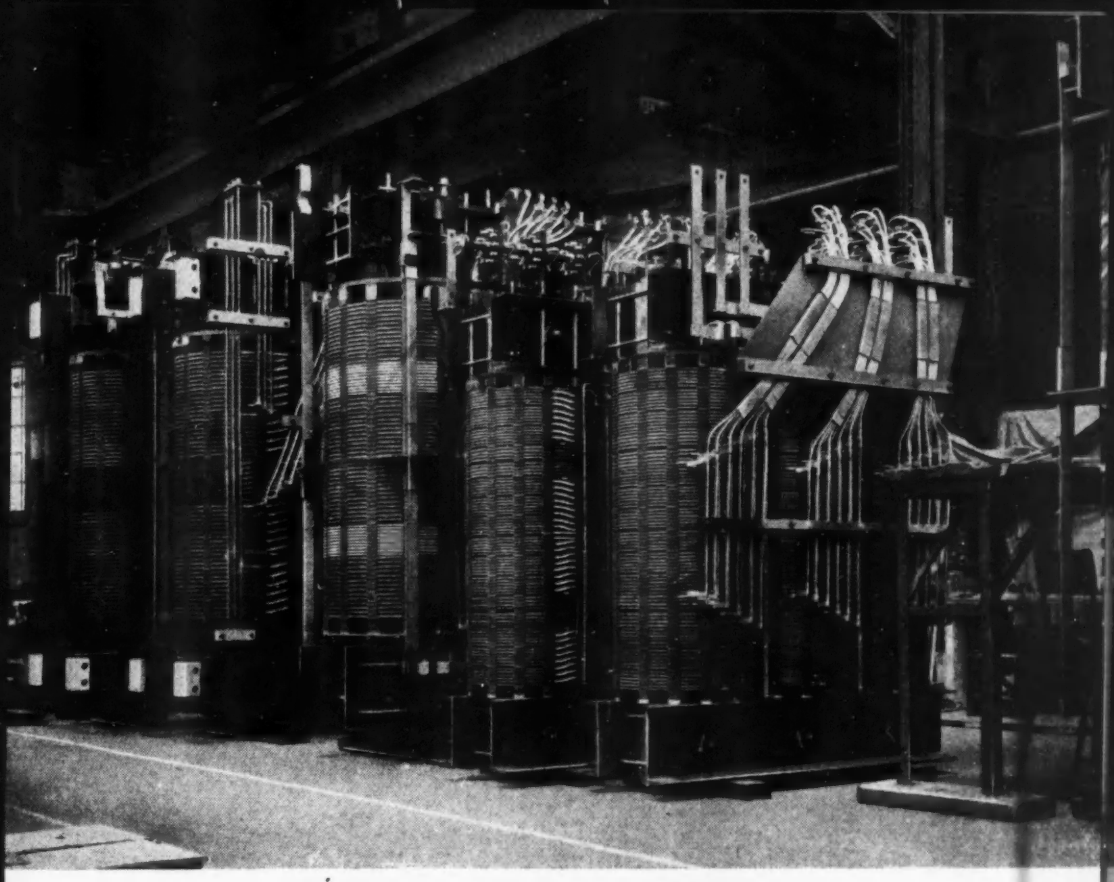
Size: 8 x 7¼ x 4½ in.
Weight: 6¾ lbs.
(including leads).

Current: A.C. and D.C. (0 to 10 amps).
Voltage: A.C. & D.C. (0 to 1,000 volts).
Resistance: Up to 40 megohms.
Capacity: .01 to 20 μF.
Decibels: −25 Db. to +16 Db
Audio-frequency Power Output: 0 to 2 watts

Sole Proprietors and Manufacturers.

● ***Fully descriptive literature on request.***

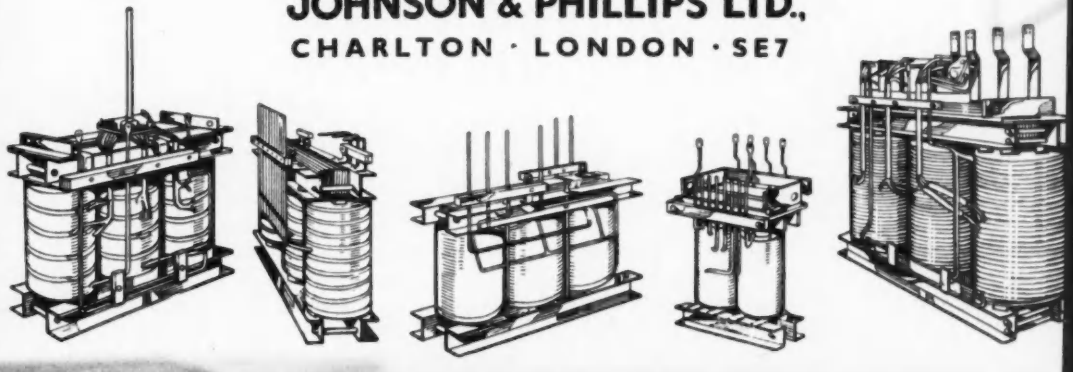
The AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.
WINDER HOUSE • DOUGLAS STREET • LONDON • S.W.1 *Telephone: VICTORIA 3404/9*



NOT ALL MVA's

Not all the transformers we build are measured in MVA, but our reputation for building transformers with "plenty to spare" certainly seems to be attracting a lot of large jobs our way. The three 15 MVA units on the left are for the B.E.A.; the two 4 MVA units in the centre are for the N.C.B.; while the 10 MVA unit just showing on the right is for Australia. When you're needing a big unit - or a little one - it's worth remembering that a J.& P transformer has "plenty to spare."

JOHNSON & PHILLIPS LTD.,
CHARLTON · LONDON · SE7



Lighting Fittings manufactured by Allom Brothers Ltd.

'Perspex' for the Modern Store

Mazda Lighting Fittings manufactured by British Thomson-Houston Ltd.

Lighting units that are both attractive and efficient are required for modern stores.

These fittings fabricated from 'Perspex' acrylic sheet meet these requirements at Bobby & Co. Ltd., Bournemouth.

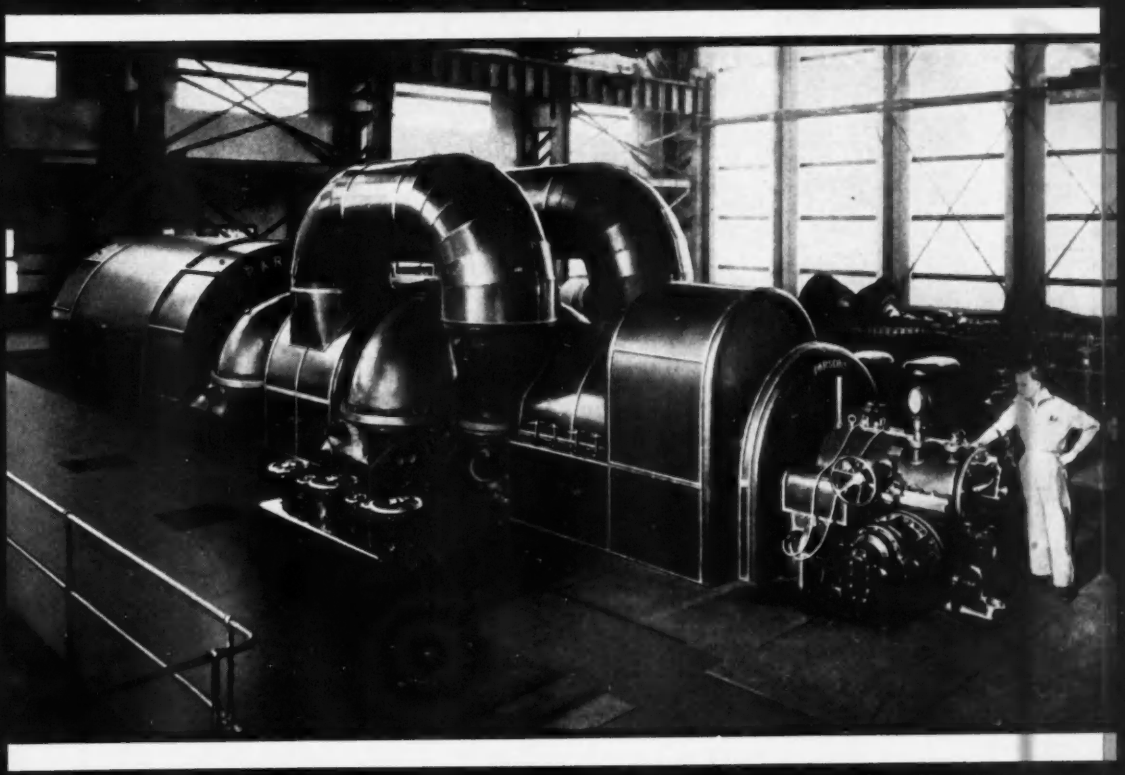
'Perspex' is the registered trade mark of the acrylic sheet manufactured by I.C.I.

IMPERIAL CHEMICAL INDUSTRIES LIMITED, London, S.W.1

P.435

CONGELLA · · · · · · · ·

South Africa



TURBO-ALTERNATORS

C. A. PARSONS & Co., Ltd.

HEATON WORKS · NEWCASTLE UPON TYNE, 6

TANT

THE NAME THAT MEANS QUALITY IN

PLASTICS

For your Plastics remember that Tants, who are noted for technical accuracy and delivery, offer you the benefit of over 40 years experience and a modern plant with a splendidly equipped tool-room. No subject or problem is too difficult for them.

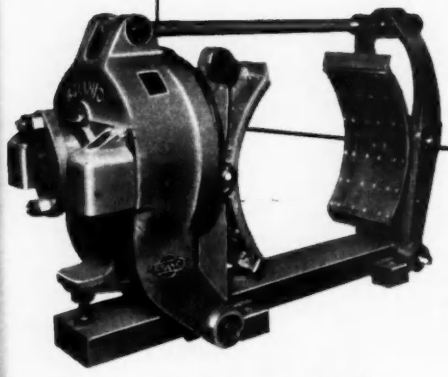
W. H. TANT & CO. LTD.
PIONEER PLASTIC HOUSE
TRANSANT WORKS, DOLLMAN STREET,
BIRMINGHAM 7

Telephone: ASTON CROSS 3232/3
Telegrams: "TANTAMOUNT B'HAM"

Advt. of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38/39 Upper Thames Street, London, E.C.4
Branches at Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield.

IGRANIC

MAGNETIC DEVICES. TYPE 'M' BRAKE.



FOR D.C. SERVICE
(OR A.C. WITH RECTIFIER)
EMBODYING DIRECT ACTION
MECHANISM ELIMINATING ALL
TOGGLES

For motors up to 350 h.p. using brake drums 8 ins. to 30 ins. diameter.

OUTSTANDING FEATURES

- Low head room.
- Bearings for hand release lever.
- 180° effective Braking surface: short brakeshoe stroke.
- Nickel-Chrome steel bushes limit wear and lengthen life of bearings.
- Long bearings at all points assure years of service. Main bearings fitted with grease nipples.

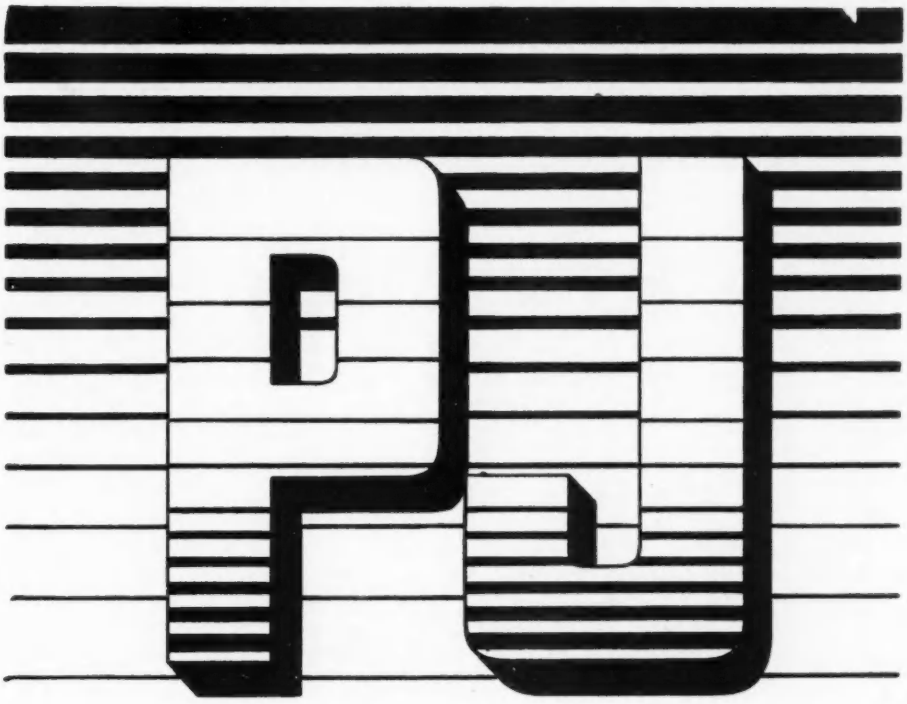
Full particulars of this Brake and other Igranic Magnetic Devices can be obtained upon application to Publicity Dept., Bedford, or any branch office.

HEAD OFFICE AND WORKS — BEDFORD

EXPORT DEPT.—VICTORIA STATION HOUSE
191 VICTORIA STREET, LONDON S.W.1

BRANCH OFFICES — LONDON · BIRMINGHAM
BRISTOL CARDIFF · GLASGOW
LEEDS · MANCHESTER · NEWCASTLE SHEFFIELD

ELECTRIC IGRANIC CO. LTD.



Steel Sheets for the

Electrical Industries

PARTRIDGE, JONES & JOHN PATON LTD

PONTNEWYNYDD, NEAR PONTYPOOL

TELEPHONE PONTYPOOL 131/2

WORLD ACCLAIM!

"Sterline"

overhead low-voltage transmission cable, embodies features which we can justly claim to be abreast of, if not in advance of the times. Not only do we ignore climatic extremes, we know STERLINE has a lower initial cost—is lighter in weight and is easier to handle than the "old" braided and compounded weather-proof aerial wire. Needless to say, we have made and are still making many thousands of miles of the type we now call "old", simply because we stress the importance of pleasing all cable users.

Full details of STERLINE will be sent on request: these will include specification, sizes, weights and prices.

STERLING

CABLE COMPANY LIMITED

ALDERMASTON BERKSHIRE

TELEPHONE READING 1000

TELEGRAMS "STERLING PHONE READING":
WORKS AT ALDERMASTON AND WARRINGTON, LANCS.

Meticulous Metering

by the METROVICK TYPE NF Watt-hour Meter

2—CASES AND COVERS

To meet the differing requirements of users at home and overseas the NF Meter is made in various types of cases and covers:—
(a) Pressed steel case and moulded glass cover.
(b) Pressed steel case and cover.
(c) Moulded insulation case and cover.
In all types the joint between the case and cover is made dust and damp proof by a cotton gasket cemented into a groove in the cover.

Other advertisements in this series:—
3—PERFORMANCE: 4—REGISTERING MECHANISM: 5—DAMPING SYSTEM: 6—RESILIENT BEARING: 7—TEMPERATURE COMPENSATION: 8—ACCESSIBILITY and TERMINALS: 9—CALIBRATION ADJUSTMENTS.

WRITE FOR A COPY OF PUBLICATION S.P. 7356/2

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER 17
Member of the A.E.I. group of companies

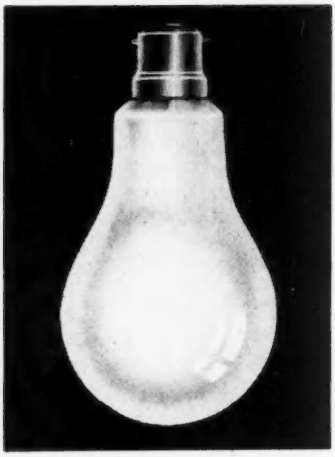
METROVICK *Instruments, meters and relays*

THINK! up to 20% more light

ITS WELL WORTH SPECIFYING

Osram

COILED-COIL LAMPS



Take for example the 60 watt OSRAM coiled coil lamp. It gives 15% more light than an ordinary tungsten lamp of equivalent wattage and consumes no more electricity — Think! increased light without increased cost of running. It is always worth while specifying Osram coiled coil lamps.

A G.E.C. PRODUCT MADE IN ENGLAND

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.I

ELECTRICAL TIMES

Vol. 119 No. 3093 THURSDAY, 15 FEBRUARY, 1951

PUBLISHED EVERY THURSDAY

SIXTIETH YEAR OF PUBLICATION

CARDIFF POWER STATION, PHOTOGRAPH 255

PLOTTING VOLTAGE GRADIENTS, *by M. E. Peplow*, B.Sc. (Hons.), Grad. I.E.E. .. 256

SUBSTATION LIGHTING PROBLEMS 258

WROTHAM EXPERIMENT 259

OUR READERS' VIEWS 261

MAINTENANCE METHODS—No. 6 262

A YEAR OF RESEARCH 264

PROBLEMS AND PRACTICE IN ENGINEERING 266

FINANCE FOR STANDARDISATION 268

PROGRESS IN PRODUCTION—No. 6 269

OVERSEAS NEWS 272

PERSONALITIES IN THE INDUSTRY 274

CONSTANT TORQUE WINDER 277

U.S. REPORTS ON INCORRECT SWITCHING 278

THE BUYER'S COLUMN 279

DIESEL-ELECTRIC LOCOMOTIVE FOR SOUTHERN REGION 281

TESTING RADIO VALVES 282

THE WEEK IN NEWS 283

Questions in Parliament 287

Electric Supply News 288

Company Activities 289

COMMERCIAL INFORMATION 290

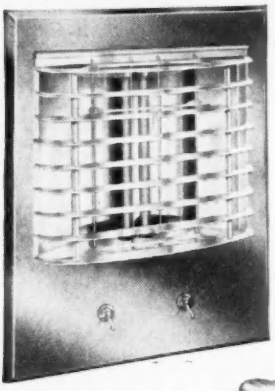
CLASSIFIED ADVERTISEMENTS *51*

INDEX TO ADVERTISERS *60*

SUBSCRIPTION RATES.—United Kingdom and Overseas £1 17s. 6d. per annum. Canada C$6 50c., U.S.A. $5 50c. per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies 6d. each.

OFFICES — SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telephone - HOLborn 6016 Telegrams - Equivolt, Estrand, London

G.E.C. DISPERSIVE HEAT REFLECTOR FIRES



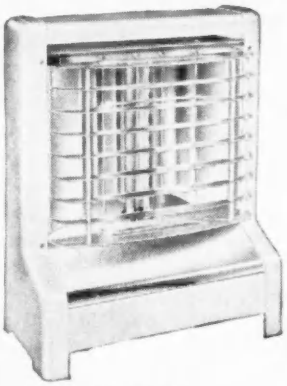
provide comfortable WARMTH and SAFETY

British Patent No. 563,095.

These three fires incorporate a scientifically designed multi-parabola reflector which *ensures comfortable warmth* over an arc of 120° in the horizontal plane, the heat being spread uniformly over the whole area.
The appearance of these fires is bright and cheerful, as a substantial part of the reflector is flashed when viewed from any angle within the 120°.

D2852. Inset Fire in chromium finish. Loading 2000 Watts.
Price **£4.16.0.**
Purchase Tax **£3.10.7** extra.

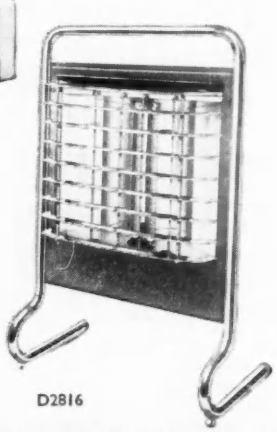
D2811. Portable Fire in Bronze, Cream or Green with chromium reflector. Loading 2000 Watts.
Price **£5.2.0.**
Purchase Tax **£3.15.0** extra.



D2816. (Below.) Portable Fire in Cream or Green with chromium reflector and tubular frame. Loading 2000 Watts
Price **£5.12.0**
Purchase Tax **£4.2.4** extra.

The LOUVRE GUARD
. . . for additional safety

The louvre guard in anodised aluminium D.3050 (British Patent No. 639,637) shown on these three fires, has a very pleasing effect and gives additional protection. It is supplied as an optional extra.
Price **£1.0.0.** Purchase Tax **14/9** extra.
Tax does not apply when guard is ordered separately.



D2816

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Editorial

TARIFF INCREASES AGAIN?

IT is generally known that the B.E.A. has not been happy about the marginal trading conditions under which they have been operating, and have been toying with the idea of raising tariffs. In fact, two boards have gone even further and already announced increases. The recent rise in coal prices would seem to give a convenient opportunity for an all-round increase of tariffs, judging by an announcement of the B.E.A. which states that they will now have to pay £7·5 m. more for coal, based apparently on a 14% increase in consumption. Part of this will be recovered automatically from industry, leaving £3·5 m. to be borne in respect of non-industrial consumption, and in consequence area boards have been asked to submit proposals for spreading this cost amongst consumers. The direct way of raising non-industrial tariffs (other than flat rates) by ⅛d. will net a further £10 m., and although this covers the extra cost by as much as three times, it seems the most likely step to be taken at a time when other costs are continuing to rise. It is clear that neither the B.E.A. reserves, nor the profits are sufficient to act as a buffer against higher costs of this type and if frequent increases are to be avoided, the additional margin provided by the ⅛d. per unit is not excessive. The unfortunate feature is that not all area boards have yet put into operation a co-ordinated tariff policy. They would be wise if such a step coincided with any further increase.

PAYING FOR STANDARDS

OUTSTANDING amongst the many helpful recommendations of the Cunliffe Committee Report on the British Standards Institution is that for doubling the income from industry. The present minimum subscription of two guineas should be raised to five, say the Committee, but the larger private firms and the nationalised industries should base their subscription not on this minimum, but on the total number of employees,at a rate varying from 4d. to 6d. per head, according to the use made of the Institution facilities. The only way of reducing this levy and still obtaining the annual income required is for present members of B.S.I. to push an intensive recruiting campaign for "non-subscribers, clearly obtaining the benefits of B.S.I. work" to join them. The report quotes 3,000 firms as members of the Institution; there were 50,000 manufacturing establishments employing over 10 workpeople in 1948, and even at the minimum rate this secures an income of £212,000. Looked at another way, there were some eight and a half million people employed in all manufacturing industries: at the lower capitation fee, ignoring minimum contributions, this represents a potential annual income of £143,000. The estimated sum required from industry is £135,000, and the moral is obvious. Hard work and enthusiasm will be needed to attract firms to support the Institution, but it is in the interests of both the present members and the country that the effort should be made.

A.M. VERSUS F.M.

THE series of tests now being conducted by the B.B.C. from Wrotham will, it is hoped, bring further elucidation to the long-standing controversy on the relative merits of amplitude and frequency modulation. While there is much to be said theoretically for frequency modulation—improved signal-to-noise ratio and higher fidelity—in practice many other factors need consideration. As far as entertainment broadcasting is concerned two of these are of major importance. First, does the higher fidelity of reproduction justify the addi-

tional cost of the f.m. receiver? And secondly, what proportion of the listening public is capable of hearing and appreciating frequencies covering a band of 50 to 15 kc/s? As far as we can judge from the numerous receiving sets we have listened to, the main criterion of quality in the public view is a predominance of the lower notes. Admittedly, the discerning listener would appreciate the introduction of high-quality, low-interference reception, but it is doubtful if he exists in such numbers as to justify the cost of running a general f.m. service, and the production of f.m. receivers on a large scale.

COLLEGE TESTING

COMPREHENSIVE testing is the sound basis of safety and efficiency in all electrical apparatus, a fact recognised implicitly in the whole range of British Standard Specifications. Although the detailed procedure of testing presents few difficulties to the larger manufacturer, who has the required measuring equipment to hand, it is otherwise with small firms. Perhaps they may be making some simply constructed appliance which needs little instrumentation for routine checking, but is more demanding in the conditions for type test. Despite this difficulty, quality need not suffer, if an idea developed by the Electrical Research Association becomes widely applied. Local technical colleges usually have the measuring instruments and apparatus needed, and arrangements could be made for them to carry out the tests. They have been proved willing, and so far as tests give useful background information for teaching and research, actively enthusiastic. The E.R.A. is acting as a clearing house for inquiries from its members for such facilities, but other firms should be able to conclude appropriate arrangements for themselves. Quite apart from their main advantage in promoting good design and safe construction, such schemes present an excellent opportunity for the industrialist and the local technical teacher to become better acquainted, to the greater efficiency of both. On all counts, the suggestion deserves encouragement.

SILICA-COATED DEMAND

THERE are signs that the public has taken kindly to the kindly light of silica-coated lamps. Supplies are far from plentiful and retailers have to be content with small consignments and consequently disappoint their customers. The surprising feature is that the lamp has only been on the market for nine months, and in the lower wattages much less, so this immediate demand must be gratifying to the manufacturers. It is too insistent to be merely a delayed replacement of the defunct opal lamp; it is more truly interpreted as a growing consciousness of the public in good lighting: in the quality of illumination as well as its quantity. Quite clearly, silica-coated lamps have come to stay, and may well become a serious competitor of the pearl bulb.

Meteor

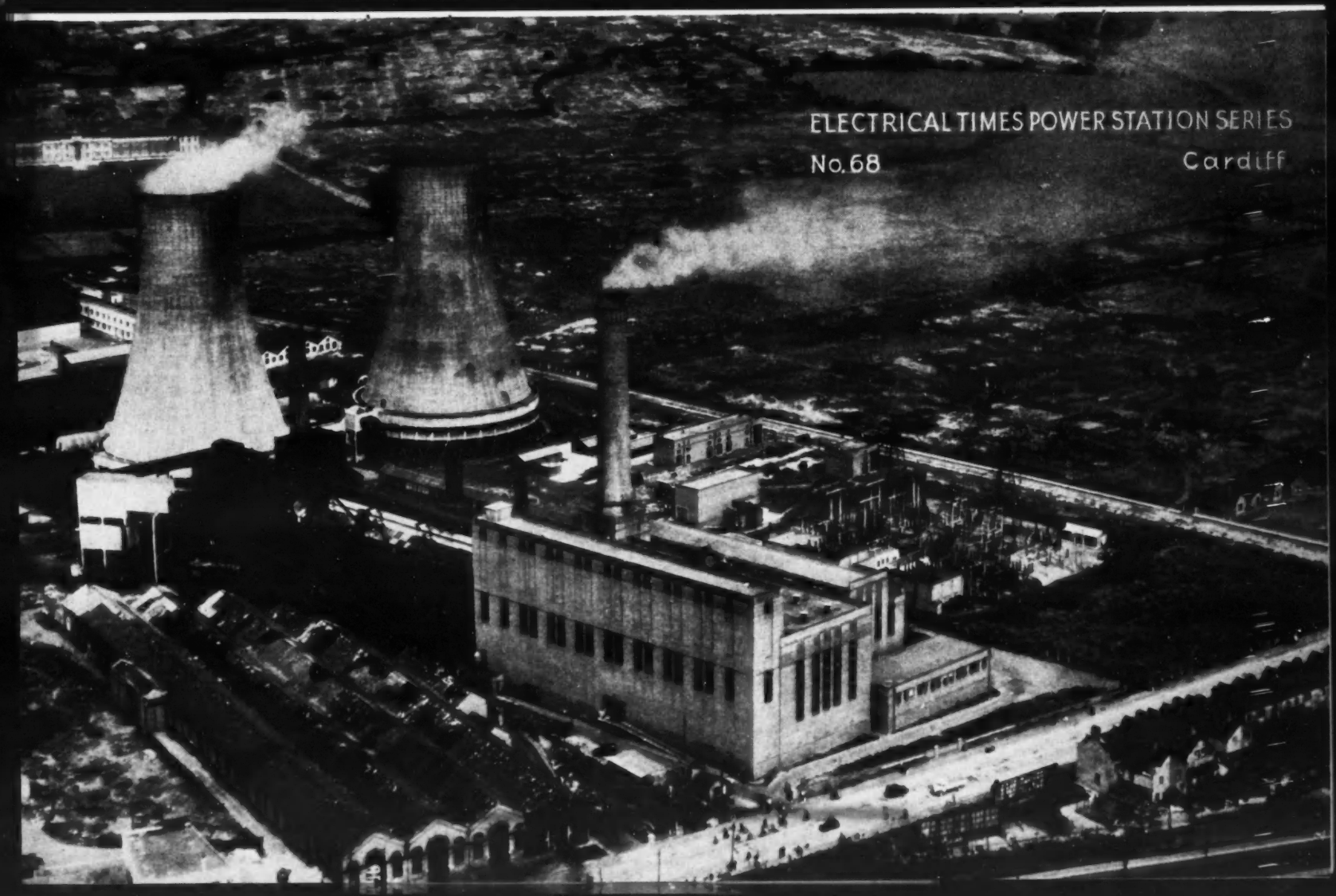
THIS WEEK'S PHOTO

CARDIFF power station, which is operated by the South Wales Division of the British Electricity Authority, was commissioned by Cardiff Corporation in 1902, when the plant installed consisted of four 300 kW sets. Steam was provided by Lancashire boilers at 150 lb/sq in. and superheated 100° F. Two further 900 kW sets were subsequently installed. About 1905, 3-phase current was first made available by the installation of one 500 kW motor generator, generating at 6,600 V, 50 c/s. This capacity was increased in 1906 by the addition of two mill type engines each with a 1,100 kW alternator. In 1908, a 2,000 kW turbo-alternator was installed, and in 1914 and 1917 respectively, two further 2,000 kW sets, one a Fraser Chalmers-Siemens, the other a British Westinghouse. In those years and in 1919 a total of eight water tube boilers complete with ancillary equipment were added. Reconstruction of the station to enable higher steam pressure to be used was planned in 1920, and as a first instalment, a 5,000 kW B.T.H. set was installed in 1921, with a B. and W. tri-drum boiler. Later this was followed by two additional B.T.H. 5,000 kW sets and one Fraser Chalmers 12,500 kW set, together with eight B. and W. boilers.

Plans were prepared under the provisions of the 1926 Act for a major reconstruction of the station.

In December, 1942, one 30 MW Metropolitan-Vickers turbo-alternator was installed, followed by the commissioning of a further set in 1943, with two B. and W. 180 klb/hr boilers for each set.

In the year ended March, 1950, units generated were 433,451,662 at a load factor of 53·48%. The maximum demand during the year was 88·10 MW and the sent-out thermal efficiency 20·22%.


ELECTRICAL TIMES POWER STATION SERIES
No. 68
Cardiff

Plotting Voltage Gradients

Application of an Electrolytic Method to Problems of Voltage Distribution met in the Design of Circuit-Breakers

By M. E. PEPLOW B.Sc., (Hons.), Grad. I.E.E.

THE distribution of voltage across the breaks of a multi-break circuit-breaker depends, among other things, upon the capacitance-structure of the circuit-breaker and upon the potentials of the terminals of the circuit-breaker in relation to earth. The capacitance-structure is often difficult to calculate or to measure, and voltage-grading measurements on an actual circuit-breaker involve the use of potentiometers, which affect the circuit-breaker capacitances in a highly complex manner.

The electrolytic method, which has been used for the solution of many complex field-distribution problems, has been found also to be very useful in multi-break circuit-breaker grading problems. In addition to giving information about the distribution of voltage between breaks produced by the capacitance-structure, and the potential gradients along insulation, it furnishes useful data on the effects of adjacent structures and measuring-potentiometers, such as are used when full-scale tests are to be carried out.

Principle of Operation

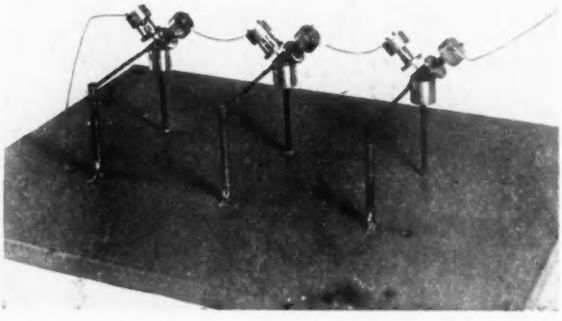
The basis of the electrolytic method may be explained as follows. If a voltage is applied to a system of capacitances, the resulting voltage-distribution depends upon the values of the capacitances, or, equivalently, depends upon the electric flux distribution. If the dielectric is now made conducting, the same applied voltage causes current-flow along the paths taken by the electric flux, since the electric flux represents the force available to move free charges. But current-flow means that potential differences exist in the conducting medium, and these potential differences are identical with those set up by the electric flux. Replacing a dielectric with a conducting medium therefore leaves the voltage-distribution unchanged, though the capacitance-system has now become a conductance-system. The voltage across conductances can then be measured with negligible error.

A particular method, used by A. Reyrolle and Co., Ltd., of Hebburn, is as follows. A scale model is made of all the essential metallic parts of the circuit-breaker, and the parts are supported in relation to earth by thin insulator rods in such a way that current-flow between parts when the model is immersed in a conducting liquid is distorted as little as possible. Fig. 1 shows such a model of a six-break circuit-breaker.

The shapes of complex parts are simplified for convenience, but care is taken to preserve the same mutual capacitance between parts. For example, two concentric cones would be replaced by concentric cylinders, with radii chosen to give the same value of mutual capacitance. The model is immersed in an electrolyte when grading measurements are to be made, and any air-bubbles in cavities of the model are removed.

The terminals of the model circuit-breaker are adjusted to the required potentials in relation to the metal sheet representing earth for the condition under consideration. Potential differences can then be measured between any

Fig. 1. The model shown in this illustration was used to derive the diagram shown in Fig. 2



two parts of the circuit-breaker, or between any part and earth. In addition, the potential of any point in the liquid around the circuit-breaker may be measured. Such measurements will allow equipotential surfaces to be plotted, and from them the electrostatic field for the circuit-breaker can be deduced, as shown in Fig. 2. A high-impedance voltmeter must be used for these measurements, in order to avoid disturbing the potential-distribution by the voltmeter-impedance.

The potentials of the circuit-breaker parts measured in this way represent to scale the potential-distribution across the full-size circuit-breaker for the same terminal-potentials as determined by its capacity structure.

It should be explained that the term "electrolytic method," although generally accepted, is rather misleading, since, although the model to be studied is immersed in a conducting liquid, every effort is made to avoid electrolysis, and to ensure only ohmic conduction.

Technique

Care is required to obtain reliable results, and some of the points in the technique are:

(1) Polarisation-e.m.f.s of the order of 0·2 V necessitate the application of more than 10 V across the model, or a high-frequency supply, in order to avoid corrections of the indicated potential differences across the circuit-breaker breaks. Lower polarisation-e.m.f.s are obtained if a salt of the electrodes is used, e.g. copper and copper sulphate.

(2) Tap-water has a suitable conductivity, but, being hard, can lead to salt deposits on the model, thus affecting the electrodes, and also causing variations in the conductivity of the electrolyte. A solution of sodium carbonate in distilled water is therefore used to ensure that no insoluble products are formed.

(3) The metalwork of the model contaminates the electrolyte, and thus leads to a varying conductivity, unless enough sodium carbonate is added to swamp this effect. Rhodium plating gives chemically inactive electrodes.

(4) Electrolytes have a temperature-coefficient of conductivity of about —2·4% per °C, and thus a constant temperature is required.

(5) Shellac is adversely affected by the tank solution, but p.v.c. sheaths are effective if insulation is required on the model.

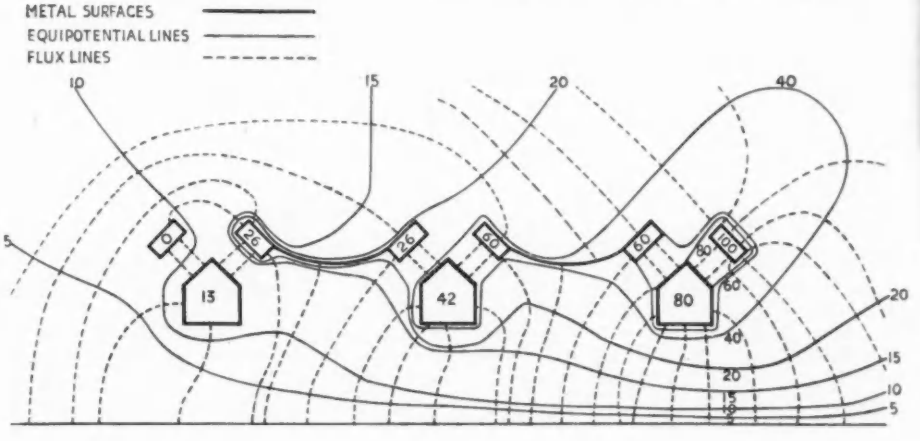
(6) Spacers in calibration "condensers" must be checked for expansion or shrinkage when left in the solution.

(7) Parallel-plate condensers of small gap have a small edge effect, and two parallel rods, with their ends in insulating-boards, are more convenient when calibrating the tank solution.

(8) To ensure that electrolyte fills all cavities in the models, a bulb syringe is used. Organic wetting agents break up when current passes in the tank, and so are not suitable.

Potentiometer-leads in the models allow a comparison to be made with grading and Schering-bridge tests of the actual breaks. Such comparison indicates agreement within 10%; exact agreement is probably prevented by

Fig. 2. This diagram illustrates the voltage gradient plot derived from three breaks in series



model-approximations and experimental errors. Potentiometer-leads can easily affect grading-measurements of circuit-breakers by 30%.

The performance of a circuit-breaker when breaking current is affected to some extent by other factors such as non-synchronised contact-separation, and sometimes by post-zero conductivity of the breaks, and hence a model is not a substitute for full-scale testing, but rather a valuable method for assisting in design and for supplementing full-scale tests.

Voltage-grading is improved by increasing the capacitance across each break, and the model is convenient for determining the grading as a function of such capacitances. Capacitance-addition is equivalent to conductance-addition in the model, and thus calibrated variable resistors are used to give the required information.

Another use of the model is in plotting field-distributions. Such plots show how the electric flux piles up on some parts of the circuit-breaker or insulating supports, and is therefore of value in the design of the insulating parts of a circuit-breaker. Models for oil-break circuit-breakers would require carbon or other material to represent the oil if an electrolyte represents the air-dielectric, since different dielectrics must be represented by different conducting materials if the field-system is to remain geometrically similar.

The electrolytic model is proving a useful accessory in the design of circuit-breakers, and it is likely that its use in this sphere will be further extended.

Substation Lighting Problems

WHEN B.T.H. lighting engineers were called in by the Southern Electricity Board to prepare a scheme for the control room at North Hyde substation they found that the building plans, included provision for a semi-circular laylight of some 20 ft radius intended to cover practically the whole of the ceiling area. The design could not be amended, and the presence of the laylight meant that lighting could only be installed above it.

There was a possibility that such a large area of glass and glazing bars would give rise to disturbing reflections in the meter panels, and the problem was to avoid this potential distraction whilst providing adequate general illumination. The desired effect was achieved to the extent of an estimated lighting intensity of 25/30 lumens per sq ft.

The control room at North Hyde substation

The laylight is slung from five rolled steel joists, on each side of which are arranged rows of 80 W 5 ft Mazda fluorescent lamps housed in angle reflectors. There are thirty-four of these, in all, augmented by three twin-lamp 80 W 5 ft bare-lamp fittings, one being placed under each of the three central joists to increase the lighting over the area of the control tables in the centre of the room. Maintenance is carried out from above by the use of a trolley which runs along the flanges of the joists; most of the fittings being attached to the joists they are, consequently, easily accessible.

All these fittings so far described are positioned to give general lighting only. It was, however, necessary to direct a certain amount of controlled lighting on to the face of the meter and switch panels. For this purpose a semi-circular annulus of glass was omitted from the laylight, near its rim, and in its place were inserted specially constructed louvre boxes housing a series of nine additional bare-lamp fittings with twin 80 W 5 ft lamps.

Electrical contracting for this installation was carried out by B.E.A.

Wrotham Experiment

B.B.C.'s Engineering Research Department is carrying out tests to study possibilities of broadcasting on very high frequencies

SOME five years ago the B.B.C. Engineering Research Department began a series of tests in order to obtain first-hand information on the possibilities of broadcasting on very high frequencies (vhf). These tests did not show conclusively whether frequency modulation or amplitude modulation was the more suitable system, and, accordingly it was decided to carry out a series of comparative tests at high power.

The place selected for these tests was Wrotham Hill, on the main London-Folkestone road, about twenty miles south-east of London. The station comprises a single-storey building housing the transmitters with their ancillary equipment, and a 470 ft mast, the base of which is 730 ft above sea level.

Wrotham's 470 ft mast forms a prominent landmark on the main London-Folkestone Road

Transmitters

The F.M. transmitter, made by Marconi's Wireless Telegraph Co., Ltd., has an output power of 25 MW and operates on a mean carrier frequency of 91·4 Mc/s (corresponding to a wavelength of 3·28 metres) with a maximum deviation of ± 75 kc/s. The Marconi "F.M.Q." system of frequency modulation has been adopted. In this system, a quartz crystal oscillator is connected through a quarter-wave network to a balanced modulator, the susceptance of which varies with the modulating signal, and in turn varies the frequency generated by the crystal oscillator. By cutting and mounting the crystal in a particular manner, spurious harmonics within the working range can be avoided.

From the crystal oscillator, the output is passed through three frequency-doubling stages and one tripling stage to produce the carrier frequency of 91·4 Mc/s. Then follow six stages of amplification. The first two are conventional push-pull stages, and the remaining four are single-ended earthed-grid stages with coaxial-line tuning elements. The final output stage consists of two BR 128 valves in parallel, giving an output of 25 kW. High-tension supplies at 6 kV and 3 kV for the valve anodes are obtained from hot cathode, mercury-vapour rectifiers in the power conversion plant.

The A.M. transmitter, also manufactured by Marconi's Wireless Telegraph Co., Ltd., has an unmodulated power of 18 kW and operates on a frequency of 93·8 Mc/s, corresponding to a wavelength of 3·20 metres. The drive equipment and the radio-frequency amplifiers are similar to those in the F.M. transmitter, except that the balanced modulator in the "F.M.Q." drive is made inoperative. The audio frequency modulator has four stages, the final stage consisting of two ACT 14 valves operating in class B push-pull which modulate the output stage of the transmitter. Supplies at 9 kV, 4·5 kV and 3 kV are similarly obtained from hot cathode mercury-vapour rectifiers.

Control and Accessories

Both transmitters are controlled and monitored in a single room with glass windows to enable the engineer on duty to watch the transmitter he is controlling. Special monitoring equipment is installed for measuring the frequency deviation due to modulation and for checking any shift in the carrier frequency.

Air-blast cooling is used throughout in both transmitters. The air can either be circulated round a closed system so that it can attain its working temperature quickly, or be drawn in from outside the building. During cold weather, the air can be discharged into the transmitter hall for space heating purposes.

A concentric feeder connects the output of each transmitter to a change-over switch via a filter for minimising harmonic radiation. By means of the change-over switches the transmitter outputs can be connected either to the feeders leading to the aerial or to test loads.

he test loads, which are identical, consist of ort lengths of concentric feeder through which ter is circulated. The power is dissipated the water, which is obtained from a supply it where its temperature is quickly raised to pre-determined value and then kept at that lue in order to prevent variations in the pedance of the load.

Power is conducted from the change-over itch to the aerial system by concentric feeders ving an impedance of 51 ohms. These in turn ed into a combining filter which prevents wer being fed from one transmitter to the her. The F.M. and A.M. signals from the ter are then carried up the mast by a single ncentric feeder to the slot aerial system.

erial Construction

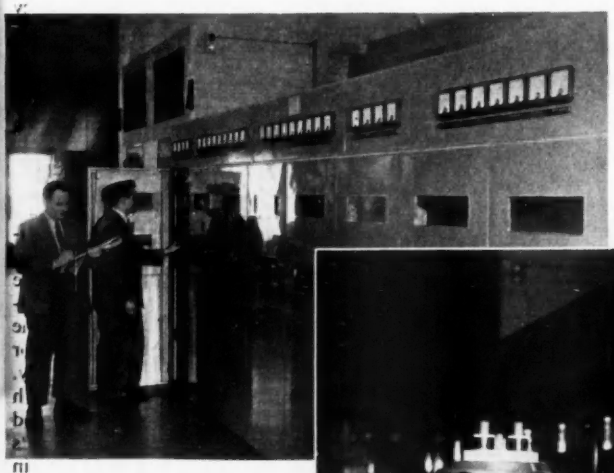
The mast, designed and built by British sulated Callender's Construction Co., Ltd., is some 50 yards from the transmitter building. It comprises a lattice steel support mast 360 ft high, on top of which is a cylindrical section 110 ft long and 60 ft in diameter, which, with the slots in its surface, forms the V.H.F. aerial.

The support mast has a triangular cross-section, each face being 9 ft across, and rests on a ball joint which permits some angular movement under wind pressure. The dead weight of the mast is 60 tons, and the maximum thrust at the base is 200 tons. Nine stays are attached in sets of three at 160 ft, 360 ft and 470 ft.

The aerial system, designed by the B.B.C.'s Engineering Research Department, consists of 32 slots in the surface of the cylindrical section, arranged in eight tiers, each tier having four slots spaced at 90° intervals round the surface.

Each slot is 8 ft high and 1 ft wide and is screened by backing it with a series of horizontal bars placed one above the other at 1 ft intervals. In the centre of one half of each slot and parallel to the edge is a rod, approximately half a wavelength long, one end of which is connected to the surface of the cylindrical mast and the other to the driving feeder. This arrangement reduces the imput impedance of the slot from approximately 600 to 150 ohms, a value which is more convenient for feeding by coaxial cable. All the slots are fed with currents of the same amplitude and phase. The aerial is suitable for any frequency within the band 87·5 Mc/s to 95 Mc/s, and has a mean power gain of approximate'y 8 db. which does not deviate by more than + 1 db. in any horizontal direction.

Power is supplied to the station at 11 kV by duplicate feeders. This is transformed to 415 V for distribution to the transmitters and ancillary equipment. A d.c. supply at 50 V is required for the transmitter control circuits and this is obtained from metal rectifiers. In addition a 240 V battery is available for emergency lighting.



Above: Engineers checking the amplitude modulation transmitter. Right: The largest transmitting valve used at Wrotham in comparison with an ordinary receiving valve

Our readers' views . . .

"The Consumer's Fuses"

IT is a pity that so much of Mr. Gough's contribution to your issue of February 1 is devoted to pointless criticisms of "Megohm's" article, whilst his sole constructive suggestion is based on the questionable assumption that the installation described was undertaken without prior consultation with the supply authority concerned.

"Megohm's" failure to convert their mains engineer is not surprising, having regard to the unimaginative manner in which Regulation 24, Electricity Supply Regulations, 1937, is applied by many local authorities. This rigid adherence to the letter of the law frequently produces results which, to say the least, are ludicrous.

I have known cases where the consumer (who, incidentally, generally pays for or defrays the cost of the undertaker's equipment, whose property it becomes) has been obliged to agree to switchgear of different manufacture being coupled to his section of the switchboard for no other reason than the desire of the supply authority to adhere to products of particular manufacturers.

Presumably the question of spare parts may have had some bearing on the matter, but this consideration does not compensate for the unnecessary expense of special adaptations or for the loss of appearance.

In dealing with supply authorities, one does well to remember that "He who pays the fiddler, no longer calls the tune."

"Ten Sixty-Six"

CHESHIRE.

• • •

Load Shedding

ON the question of shedding load over peak periods it would appear that insufficient importance is attached to the possible curtailment of radio and television entertainment from the receiving angle, as a means to assisting in this problem.

Peak listening often occurs during critical load periods, as for example, Mrs. Dale's Diary, at 4.15 p.m. each weekday. Whilst I am, of course, unable to submit actual figures, it is suggested that some value in excess of 100 MW could be saved, both in demand and fuel, if these pleasures were withdrawn for the time being. Surely the demands of industry are far more important than the domestic problems of Mrs. Dale.

F. D. Taylor

DEPTFORD.

• • •

Aluminium Windings

IN "Overseas News" in your issue of February 1st, page 187, is a note that three of a number of transformers to be made in Canada are to have aluminium instead of the normal copper conductors.

This is not a new departure, however, as it was extensively practised in Germany in the period 1916-18. It is understood that most of such transformers were re-wound with copper when it became available following the Armistice.

W. C. Kennett

BANSTEAD, SURREY.

• • •

Automatic Volume Control

REFERRING to the correspondence in your issue dated January 18 on the subject of volume control.

Perhaps this is an opportune moment to ask Mr. E. L. E. Pawley whether he can use his influence with the people responsible at the B.B.C. to see that in programmes where it is all important to hear what the artists are singing or saying, the music should be, if anything, too soft rather than—as is often the case—too loud. One often has to strain one's ears and even turn up the volume control to follow the performance, especially on TV.

H. W. Jenkins

EDGWARE.

MAINTENANCE METHODS—No. 6

Dust is the Enemy

Scrupulous cleanliness is needed where instruments are assembled

VERY small particles of dust and metal can badly interfere with the working of electrical measuring instruments. The scrupulous cleanliness which is necessary as a result of this consideration imposes restrictions on normal maintenance practice at the Enfield works of Sangamo Weston Ltd., which we were privileged to inspect recently.

The factory is mainly of single-storey construction, with a floor area of 150,000 sq. ft., the electrical load installed giving a maximum demand of something over 700 kVA. To maintain the electrical plant, a staff of 14 electricians are employed, mainly on day work. Apart from the lighting and motor load, there is a considerable total of resistive load in the form of heating equipment in the coil winding and moulding sections.

Main Substation

An incoming supply is taken from the Eastern Electricity Board at 11 kV, and transformed down in the Board's substation to 415 V. Bare copper busbars are taken through the wall dividing the main Sangamo Weston substation from the E.B. transformer-room, and circuits are tapped off these to feed the various sections of the factory. The tappings are taken through h.r.c. cartridge type fuses to p.i.l.c. cables, and terminate at o.c.b's at the far end of the runs.

Metering equipment in the main sub. includes the usual energy and maximum demand instruments, and in addition a recording ammeter, which enables the peak load characteristic to be studied. Overall power factor for the factory is kept up to about 0·95 by the use of oil-filled capacitors connected directly on to the main busbars. Two banks are used, each connected independently through fuses. The use of this comparatively inflexible arrangement of p.f. correction works well in this particular installation, since most of the varying load is resistive, and thus the capacitance required for power factor correction is unaffected by it.

The control-room is in a small flat-topped building, and to obtain some cooling effect, forced ventilation is provided, the necessary fans being thermostatically controlled.

As has already been stressed, cleanliness is essential in the assembly section. Other special requirements which bear on the electrical arrangements are a high intensity of local lighting, because of the fine work to be done, and the provision of many special supplies for the calibration and testing of the completed instruments.

General distribution is through steel conduit run overhead. Main distribution boards feed the main lighting circuits and the few motors needed in this section of the factory, and also provide tapping points for subsidiary switch fuses which are provided at the end of each assembly bench. These switch-fuses control lines which run in conduit for the length of the bench, and may have up to ten plugs connected to each of them, feeding mainly lamps under the control of the operatives themselves. Protection against the use of these lines for any heavy supplies is provided by fusing them at the low value of 10 amps. An exception is provided by benches in sections which use ageing coils for meter conditioning. Although taking a low current, these devices have a heavy starting surge, and the switch fuse controlling the line has to be wired for a heavier current. The standard of protection is maintained by providing lamps fed from these runs with fused plugs.

Soldering irons where used are worked at 12 volts. They are of light construction and are supplied in groups from 200 W transformers fixed under each bench. Connection to this supply is by two-pin plugs that cannot be forced into the three-pin lighting supply sockets.

Much of the lighting of the benches is tungsten filament, but for general illumination reliance is placed on fluorescent lamps supported low over the work. In the positions where the finest work is in progress, glass canopies are suspended under the fluorescent lamps to prevent dust falling off them and on to the work.

Special supplies for calibration purposes are

generated in two machine-rooms and distributed round the shops in conduit for d.c. supplies and in floor ducts for a.c. Electronic voltage stabilisers are provided in both machine rooms, so that the voltages are independent of the load imposed at any particular moment. The stability required for d.c. calibration supplies is to 1/10,000 volt. For a.c. testing variable frequency machines operating over the ranges 25/40 c/s, 40/80 c/s, and 70/100 c/s are provided.

Maintenance Practice

Almost all maintenance work, and all new installation work has to be arranged for completion outside normal working hours in this part of the factory, because of the limitations imposed by dust considerations. Few motors are involved, these being principally small series wound d.c. machines in the coil winding section. It is necessary to keep a close watch on the brush wear of these machines, as if the operatives do not report this, damage to the commutators can easily result. Another item of plant that requires special attention is a magnet-raiser which consists essentially of a contactor switching in a highly inductive circuit. There is a tendency for the contacts to become burnt when operating on this difficult duty, but since they form part of a low resistance series circuit, they must be kept in good condition if serious current reduction is to be avoided.

Lamp cleaning is the responsibility of the janitors attached to each section of the works. No regular routine of lamp replacement is followed, reliance being placed on section foremen to report failures. Fuses are where possible of the non-deteriorating cartridge type. Where semi-enclosed designs are in use, the hot running of distribution boards is taken as a signal to inspect all elements for ageing due to oxidation. This routine is aided by the general practice of making one member of the electrical maintenance staff responsible for a particular shop. Many of the advantages of a patrol system result from this arrangement.

A particularly worrying form of trouble peculiar to the present difficult supply position has arisen with the fluorescent lamps. At times of heavy voltage reduction, the current through some lamps falls to such an extent that the discharge is extinguished. The thermal starters employed, thereupon, cause the tube to restrike, and the same cycle occurs some little while later. Eventually, the starters burn out from over-operation.

Machine Shops

The clean conditions of the assembly sections are not to be expected in the machine shops, where the electrical maintenance staff have to fight a severe battle against oil and swarf. Distribution is again through steel conduit run along the ceiling, and the maximum possible subdivision of circuits is aimed at. Most of the motors are relatively small size three-phase induction motors. Direct-on starting is used for delta wound machines below 1 h.p., but for most larger sizes, push-button star-delta starters are employed. A considerable amount of single-phasing trouble was experienced during the war, when many unprotected switches had to be used, but now the thermal trips in the starters provide effective protection against this type of fault.

A check is kept on the maintenance of motors by the operation of a card index system. Each machine in the works has a number, and cards are kept by the electrical section under these numbers giving details of the electrical motors involved and of the supply required. After a short time in operation, each motor is cleaned, greased and overhauled, and the opportunity is taken of noting the type numbers of its bearings and entering these on the cards. All details of the subsequent history of the motor then appears on its card, including in particular the dates of all inspections.

Although the advantages of standardisation are recognised by the maintenance staff, it has

Glass canopies protect work in the assembly section from any dust that may fall from the fittings above

been difficult to achieve with motors, since the factory has expanded rapidly, and machine tools have been accepted with whatever motors were available. An attempt is, however, being made to keep to one type of control gear, so that the fewest number of contact parts have to be stored.

Motor Maintenance

Most of the machine-shop operatives are engaged on piece-work, so that there is little opportunity of interruptions for routine maintenance during normal factory hours. Reliance is mainly placed on two night-duty men who go through the starting gear as much as is possible, cleaning, blowing out, vaselining contacts and checking spring tension. Even a wipe down of covers helps to prevent trouble. In the automatic screw shop one man is continually on duty with the object of keeping motors and gear reasonably oil-free, and all switchgear is wiped out on alternate Saturdays.

Trouble due to oil attacking cabling has been negligible since p.v.c. insulation replaced rubber for machine wiring. There has been little evidence of oil vapour affecting motor windings. One relative prevalent source of breakdown is the entry of small pieces of swarf into ball and rotor bearing housings, a cracked ball and wrecked bearing resulting, with very little warning of approaching trouble.

When the electrical department is running fairly quietly as regards new installation work, the machine index cards are examined to find which machines have been running longest without overhaul. Arrangements are made with shop foremen to withdraw these for a day or so, and they are then completely checked over. So far as the press shop is concerned, close liaison is maintained with the mechanical staff, so that electrical maintenance can be carried out during machine adjustments.

Oil circuit breakers on the main feeders are stripped down at intervals of eight to twelve weeks, the oil being checked and changed if necessary and the contact surfaces cleaned. Immersion type heaters used on the coil impregnating plant are also regularly inspected, resistance measurements being made as a check on the ageing of the elements.

In the Bakelite moulding sections, dust causes some trouble owing to its fineness. There is some risk of fire or explosion where the dust collects in the extract fans. Preventive measures include the regular brushing down of girders and cleaning out of the fans.

Our thanks are due to Sangamo-Weston Ltd., for permission to visit the factory and for a full description of their electrical maintenance system.

A YEAR OF RESEARCH

£400,000 needed for Leatherhead Extensions

STEADY progress in many branches of investigation is recorded by the Electrical Research Association in its 30th annual report, which covers the year October 1, 1949, to September 30, 1950. No outstanding reorganisation occurred in this period, which was marked by the election of Lord Citrine to the presidency of the association. A foreword to the report does, however, note that the Council of the E.R.A. have now agreed on plans for the projected buildings at Leatherhead.

Financially, the year was marked by a small deficit of £1,186, with a total income of £215,961. A new agreement on terms of grant will have to be negotiated with the D.S.I.R. this year, and it is anticipated that an increased industrial income will be required to maintain the same level of official grant. In addition, financial support from members will be required for furtherance of the Leatherhead project and further details of the magnitude of this were given at the annual dinner, reported below.

The greater part of the report is taken up with notes on research work, both current and completed. Only some of the more interesting points can be recorded here, and these are best taken section by section.

Insulation and dielectrics are the subjects of three main groups of investigations, covering, respectively, basic work on the solid state, gaseous discharge phenomena and, finally, specific materials in relationship to their use in industry. Interesting practical advances are possible from work to elucidate the mechanism of ultimate failure in semi-conductive glazes on porcelain insulators, which appears to spread from initially minute corona effects. Practical results will also follow the considered revision of the present International Tables on voltage measurement by spark gaps. In the "specific materials" field, an investigation is being planned on the use of inhibitors in transformer oil.

Long-term switchgear work follows three

paths; small-scale study of arc transition and re-ignition with air blasts, the behaviour of the arc around current zero in the presence of a blast, and the influence of the arc on gas flow. Transition phenomena have been illustrated by a 70,000 pictures/second colour film.

Working Conditions

Work for the preparation of steam tables for high pressures and high temperatures is proceeding under E.R.A. control at Imperial College, London. Means of measurement in the apparatus to be used have been refined so that an accuracy of 1 part in 25,000 at 1,000 atmospheres is expected. On the application side, a detailed scheme has been prepared for exploring the creep and relaxation properties of a rotor forging in molybdenum vanadium steel.

Electricity Supply

The important work on wind generation carried on by the Association has been fairly widely reported. With reference to transmission, an investigation on the movement of, and stresses in, cables confined in ducts has continued. The electrical, thermal and mechanical stresses produced by short-circuits on cables are also the subject of continued study. A considerable amount of past work is being summarised in a handbook on the electrical characteristics of overhead lines.

A panel working on d.c. transmission had, by the end of the year reported, nearly completed its proposals for a practical trial scheme, but for various excellent reasons progress in this respect has been slow.

Surge phenomena investigations have continued with measurements at Weston-super-Mare. Facts and statistics concerning lightning are still being collected, and it is noted that nine area boards are now collaborating.

For transformer investigations, a 100 kVA distribution type unit has been ordered, provided with bobbin-type coils and designed so that the important parameters can be varied. A simple piece of apparatus has been tested for analysing the gas in a Buchholz relay, and so determining the type of fault producing it.

Information

Noted in the final section of the report is an arrangment made with certain technical colleges and university departments whereby the E.R.A. will act as a clearing house for inquiries from smaller firms for testing facilities. The information bureau is handling these matters, and it is anticipated that type tests or checks on prototypes would provide the kind of work acceptable to the teaching establishments.

Annual Dinner

His attendance at the World Power Conference in India prevented the president of the Electrical Research Association, Lord Citrine, from presiding at the annual luncheon held last week. His place was ably taken by Sir John Hacking at the gathering which maintained its reputation as one of the highlights of the electrical calendar.

The toast of "The Association" was proposed by Sir Archibald Gill, who spoke of the objects of the Association. His knowledge of its activites came from work with the G.P.O., particularly in connection with induction interference between power and telephone lines. The E.R.A. not only carried out work in its own laboratories, but sponsored research elsewhere. He was pleased to learn that the D.S.I.R. grant had been increased.

An explanation of the reason for his occupying the chair was given by Sir John Hacking in replying. In his review, he pointed out that the future of the country will depend on exports and, with a limited labour force, this can only be done if the products are of outstanding excellence, and this depends on research. The E.R.A. was one of the Associations that were set up at the end of the first world war, when the Government realised how much we had been dependent on other countries. Manufacturers had their own research establishments but not on the present scale, which is many times greater than that of the E.R.A. These do not, however, obviate the need for a central research association. For one thing such an association well known in foreign countries will have a good propaganda effect. The B.E.A. was extending their own research facilities, but they would continue to support and rely on the E.R.A.

The E.R.A. had reached a milestone, and an extension of research facilities had become necessary. Land for new laboratories had been purchased at Leatherhead, and for this he paid tribute to Mr. Astbury. Plans have been prepared and the first stage will cost £400,000. This calls for special financial arrangements, and the D.S.I.R. will contribute substantially and the Association will use its reserves, but additional help is needed. Another milestone is the increase in the D.S.I.R. grant by 40%, but this calls for a 70% increase in donations, and here again the B.E.A. and manufacturers should co-operate.

Dealing next with the work of the Association, Sir John said that one of the most valuable fields was inductive co-ordination. Work on insulation was valuable but not yet crystallised out for practical engineers. Another field was transmission at high voltage, particularly d.c., so that the next step can be taken without further experiment. Finally he paid a tribute to Dr. Whitehead and his workers.

Although the president was absent, Mr. H. Astbury proposed this toast, joining with it Sir John Hacking. They had hoped that the new Leatherhead laboratories would be completed in Lord Citrine's presidency, but this should be possible as he will have a further year of office.

Problems and Practice

IN ENGINEERING

Another Bathroom

THIS is a case with some unusual conditions, which occurred in Nigeria. Shocks were reported from a bathroom, where it was found that they were obtained between the water tap and the water in the basin. Testing with a voltmeter showed a small potential difference between the tap and the waste pipe, and although this never exceeded 7 volts, and was usually about 1 volt, it could be felt.

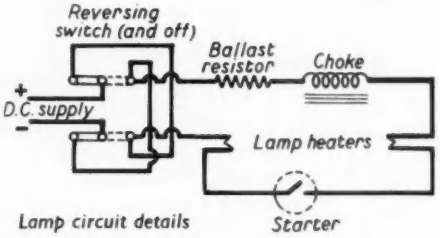
Distribution is p.i.l.c. cable, a routine check of the continuity of the sheath had been made the day before the complaint and it was found to be good. The installation in the house is in aluminium alloy conduit, bonded to the cable sheath. Water mains are asbestos cement, with galvanised iron service connections. At the point of entry to the house there was a p.d. between the cable sheath and the water pipe of 0·1 volt. This took place during the dry season when the ground resistance is very high. Examination of the wiring showed a fault where a fan had been connected, between neutral and conduit. This was in the room below the bathroom in question, and apparently the conduit, which was buried in a reinforced concrete floor, was connected to the waste pipe via the reinforcement material. Compared with normal practice in Britain, the mains are of small section (there is no heating load to worry about), and an out-of-balance load could easily produce a p.d. of 10 volts between neutral and cable sheath, which is apparently enough to give perceptible shocks in the tropics. On removing the fault, there was no measurable p.d. between the tap and the waste pipe.—*John Mellanby*, M.A., M.I.H.V.E., M.Inst.F., *Ibadan*.

Fluorescent Tubes on D.C.

WHEN called to attend to a faulty fluorescent light recently, I encountered an unusual fault. The complaint was that the light would often not come on. Sometimes it flickered and sometimes it simply remained dark, but very rarely would it "strike" and stay on.

On investigation the supply proved to be d.c. and the lamp circuit was as shown in the accompanying diagram. The usual expedients of changing tube and starter were tried, but produced little improvement.

The job was left at this stage owing to pressure of work, but after two or three days the starter contacts welded together, presumably through repeated operation over



Lamp circuit details

lengthy periods when the tube would not strike. The whole circuit was then checked over and each component was tested, but nothing was found to be wrong. It was then noticed that the tube appeared to strike more easily with the switch in one position than in the other. After giving this peculiar behaviour a little thought the starter was reversed in its socket, whereupon the tube started more easily with the switch at the opposite position than before! The metal can was then removed from the starter which turned out to be of the "glow type" (the same as the previous one), and when a starter of different make (employing a heater element) was inserted the lamp started immediately and has not given trouble since. No alterations in wiring were necessary, of course, as the two types of starter are interchangeable in all fluorescent fittings except those of early manufacture.—*J. Garside*.

Failure of Cable Support

SPARKS and burning were observed on one of the wood cleats supporting one of the blue phase cables (6,600 V) on a power station main cable route. The cable was switched out as soon as practicable and the faulty cleat, which was badly charred, was removed. The cable was tested and its insulation resistance found to be infinity. The cable sheath (lead) was tested to earth and was found to have an insulation resistance of 40,000 ohms. There

are two 1 sq in. cables per phase on this route, the sheaths being connected together at one end, but there is no metallic connection to earth.

It was thought that the breakdown was due to static discharge from the sheath of the cable to the earthed supporting steel angle. Owing to the high resistance between the lead sheath and earth, the sheath was at a fairly high point in the potential gradient between the cable at 3,650 V and earth.

This theory was supported by the fact that no disturbance had taken place on the higher voltage system, such as would have been expected in the case of a phase to earth fault.

The absence of local damage to the cable also supported this view. The blue phase cables were tested up to 12,000 V to earth, the total duration of these tests being five minutes. This appeared to confirm that the cables were in a sound condition.

In an endeavour to prove the view put forward, an electrostatic voltmeter was connected between the sheaths of the cables and earth, and a voltage of 4,000 V applied to the cables. The following results were noted:

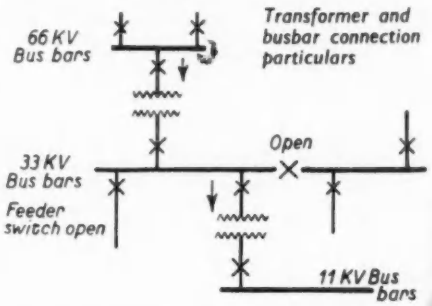
Volts on cable to earth	*Voltage between cable sheath and earth*
3,700	1,830
4,000	2,000

A further test was taken with the cable sheath connected to earth through a low reading ammeter, when it was found that with a voltage of 4,000 V on the cable there was a steady current from the cable sheath to earth of approximately 0·115 amp.

These figures appear to indicate that the trouble was entirely due to the cable sheath not being earthed, the wood cleat affected being the weakest link in the insulation of the cable sheath from earth.—*M. I. C. E.*

Emergency Tap Changing

DURING the middle of a week it was reported from a manned substation that when the on-load tap change gear of a large 33 kV/11 kV transformer was operated, startling noises were heard coming from the divertor switches tank, and when left on a certain tap position, the switch tank warmed up considerably. Due to the variation in voltage and loading of the 33 kV feeders it was necessary to operate the tap change gear quite a lot during the mornings and afternoons to maintain the required voltage for the supply to a number of collieries and works. After preliminary examination it was agreed that the transformer could be left in service until the week-end, provided that the tap change gear was not operated. The transformer could not be taken out of service until the week-end without causing some restriction of supply. Fortunately, there was also at the substation a larger transformer which was used as a



standby between the 66 kV and 33 kV systems. By suitable switching, the larger transformer supplied power to a section of the 33 kV busbars to which was connected the other transformer only. All the tap changing necessary to maintain correct voltage on the 11 kV busbars was carried out on the larger, i.e. the 66 kV/33 kV, transformer until the week-end, when the faulty apparatus was overhauled and repaired.—*C. O. N.*

A Dog's Life

DURING routine tests at a substation, a long test reading was taken on the main earthing conductor from the neutral point of the transformer and this disclosed a considerable leakage current. By elimination of the various circuits the leakage was traced to one particular feeder with several hundred services coming off it, and it seemed that its localisation would present some difficulty. It was actually found very easily as follows. The feeder was an overhead line, and whilst walking along its length I was a few yards from a steel pole when I saw a dog walk up to the pole with the particular object that dogs have when in the neighbourhood of poles and trees. No sooner had he done so than he ran yelping down the street. I thought this worthy of investigation and found that the earth around the pole was warm, this confirming the impression I had got from the dog's rapid exit. The fault was found to be in a street lighting box, a back entry stud on a fuse having come into contact with the case. This would probably have proved a little difficult to find but for the involuntary co-operation of the dog.—*J. P.*

Finance for Standardisation

Report Approves B.S.I. Organisation But Calls for Bigger Subsidy

JUST over nineteen months have passed since Mr. Harold Wilson, President of the Board of Trade, set up a seven-man committee to "consider the organisation and constitution of the British Standards Institution, including its finance, in the light of the increasing importance of standardisation and the extended size and volume of work likely to fall on the B.S.I. in future and to make recommendations." In its report, which is issued by the Stationery Office this week, the committee concludes that in general the B.S.I. as at present constituted is well adapted for carrying out current work and the anticipated increased work.

So far as finance is concerned, an increase of expenditure from the present £200,000 a year to perhaps £400,000 a year is expected.

Organisation

Four different levels of committee are concerned in the production of British standards. A General Council governs the B.S.I. generally, and under it come four Divisional Councils (Building, Chemical, Engineering and Textile). These councils are co-ordinating bodies which meet at least once a year. Under the councils come Industry Standards Committees, each of which controls the standardising work in a section of industry. They are appointed after the section concerned has expressed a desire to carry out a programme of standardisation. There are 53 Industry Standards Committees at present.

Technical committees draw up individual specifications. Generally speaking they consist of from five to 35 members, representing bodies interested in the project in hand, and in total they number about 2,000.

Requests for standards come from industry, and are either referred to the appropriate industry standards committee, or to *ad hoc* conferences of the interests concerned. If the proposals are acceptable, but a suitable committee is lacking, a new one is formed, and in this respect the report calls attention to the need for representation of user interests.

The most persistent criticism of the committee procedure concerned this matter of user representation, and in general the Board of Trade committee is in sympathy with this point of view, and makes recommendations to this effect. It does, however, assert that the suggestion that user representatives on technical committees are overridden by manufacturing interests, is not supported by the facts.

Where disputes exist, standards are usually held up in an attempt to secure full agreement. Cases of disagreement should be reported by chairmen or secretaries to the director, who can take steps to dispose of it or else refer it to the Executive Council of the General Council. If after their efforts disagreement persists, the B.S.I. should be prepared to authorise the preparation of a standard if the need for it is expressed by a substantial proportion of the interests concerned.

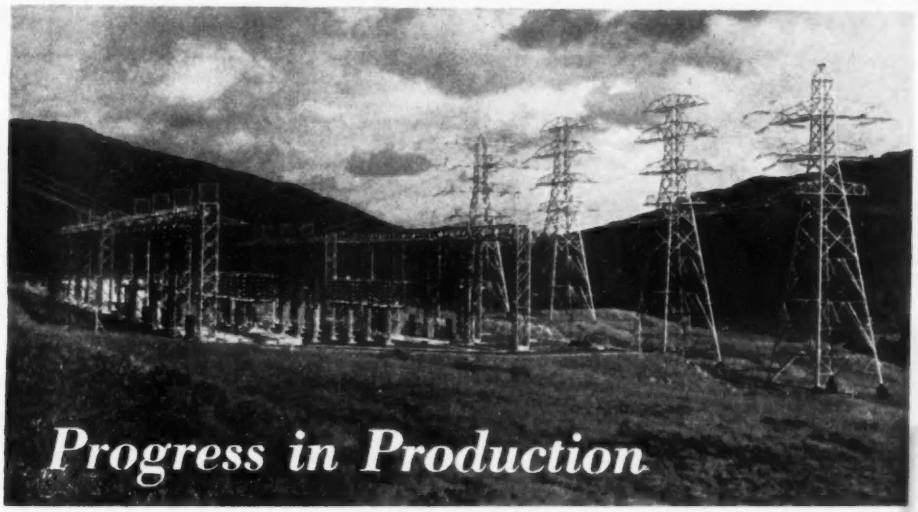
At present standards take about three years to prepare, of which time two years are taken up with the preparation of a draft for comment. There is a very even split of opinion as to whether this time is too long: many witnesses have warned against attempts at a speed up. The main contribution of the report on this matter is that secretaries to committees should complete the detailed wording of the specification, after the drafting panel has decided its technical content.

Finance

As an overall rule for financing B.S.I., the report suggests one-third from subscriptions, one-third from sales of specifications, etc., and one-third from the Government. This arrangement calls for an annual revenue of £125,000 to £135,000 from industry and commerce, and represents a doubling of contributions from that source.

It is suggested that as a matter of policy, the price of standards should not be increased, nor should the minimum private membership fee of £2 2s. Professional bodies and local authorities should pay a minimum of £5 5s. a year, and the industrial subscription for individual firms should also be raised to that minimum. In general the contribution of a commercial undertaking (specifically including nationalised industries) should be based on the total number of employees, at the rate of 4d. to 6d. per head, with the mimimum noted above.

It is recommended that the Government should contribute a minimum of £90,000 per year until 1951-52, and thereafter an amount equal to that subscribed by industry, subject to a maximum for the next five years of £150,000.



Progress in Production

This Report confirms the Heavy Demand in all Fields for Electrical Equipment

No. 6. The English Electric Co. Ltd.

AGAIN, owing to the wide range of products manufactured by the English Electric Co., we find it impossible to do a complete report of the production during 1950 and the orders received during that period.

Steam Generating Plant

Among large machines commissioned for the B.E.A. during the year were the 60 MW hydrogen-cooled turbo-alternator set at Stourport, a 45 MW unit at Ferrybridge, Yorkshire, and the second of the new 30 MW sets at West Ham, London. At the end of the year, further 30 MW sets were nearing completion at Clydesmill, near Glasgow, and at Llynfi in South Wales, in addition to two 20 MW sets at Peterborough. A 12,500 kW unit was also completed for the Staveley Coal and Iron Co.

Orders confirmed by the B.E.A. include three 60 MW turbo-alternator sets for Tilbury, to operate with steam at 900 lb/sq in. at 900° F, and two of similar output for Drakelow with steam conditions of 1,500 lb/sq in. at 1,050° F.

In the export field the most important orders were for the sixth and seventh 30 MW sets for Vierfontein Power station in the Orange Free State, placed by the Electricity Supply Commission of South Africa, and the third 60/66 MW 60 c/s set for the Windsor power station of the Hydro-Electric Power Commission of Ontario.

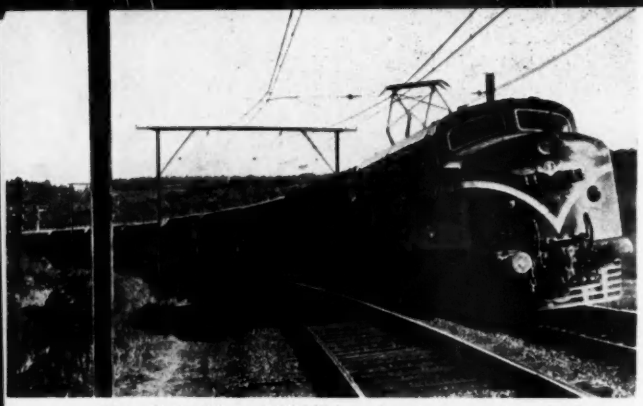
In our heading photo is seen a 132 kV switching station at Loch Sloy (N. of Scotland H.-E. Bd.)

Hydro-Electric Plant

The North of Scotland Hydro-Electric Board have ordered a 20,000 kW feathering propeller water-turbine set for Invergarry. This will operate under a net head of 146 ft with a maximum head of 181 ft—exceptionally high for this type of machine. An horizontal unit will be installed at Quoich Power Station to give 18,000 kW at 300 r.p.m.

A contract received from the New Zealand Government covers two further vertical-shaft umbrella-type generators for Waitaki power station in South Island. These are each of 16,667 kVA output at 0·9 p.f., 11 kV 50 c/s and run at 125 r.p.m. The H.-E. Commission of Tasmania ordered four 28,000-h.p. vertical reaction turbines, 370 ft head, 375 r.p.m., and two 25,000 kVA alternators. In order to meet delivery requirements, parts of the turbines are being manufactured in Great Britain, other parts by the English Electric Co.'s associates, the John Inglis Co. of Canada, and still further parts in Australia.

From Spain is an order for two 16,000 kVA vertical-shaft alternators and switchgear for Barrios de Luna Power Station, and two 25,000 kW h-e generating sets are on order for



One of the fifteen 3,000 V d.c. electric locomotives for Estrada de Ferro Santos a Jundiai, Brazil

Hume power station on the Murray River, New South Wales.

The principal event in Great Britain was the opening of Loch Sloy by the Queen. This station has four 32,500 kW units.

Transformers

Demand remained high for 33 kV transformers for the Area Boards, and orders were also received for 60 MVA and 45 MVA 132 kV units. Manufacture of the first 275 kV transformers for the "Grid" has been proceeding. High-voltage transformers were required by Australia, including some 54 MVA 220 kV 3-phase units; 30 MVA 110 kV units for Tasmania, 36 MVA 132 kV for the Electricity Supply Commission of South Africa and 64 MVA 3-phase 3-winding 220/110/11 kV transformers for Finland. For the new Taaibos Station in the Orange Free State Gold Fields are 70 MVA 3-phase 132 kV units, and the City of Johannesburg placed an order for 40 MVA 88 kV 3-phase units, while for the Punjab are some 40 MVA 3-phase 132 kV equipments.

A type OLX air insulated oil break switchboard 11 kV 150 MVA supplied for the Sudan Light and Power Co.

Switchgear

Requirements for switchgear of all types and ratings continue to be pressing. Orders received for outdoor oil circuit-breakers cover the extensions to the Craigiebuckler 132 kV switching station, two complete 88 kV substations in South Africa for Orlando Power Station and Johannesburg City Deep Substation (this order involves over thirty 88 kV breakers), two 66 kV outdoor switching stations for Madras, 40 66 kV breakers for Australia, and a large number of 33 kV breakers for various Area Boards of the B.E.A.

Many orders for metalclad indoor switchgear were booked, one of the largest covering a 75-panel 11 kV 500 MVA switchboard for an atomic-energy establishment.

High-voltage air-blast switchgear included 110 kV circuit-breakers for Tasmania, 132 kV units for the B.E.A. and Australia, 165 kV breakers for Spain, and a complete 66 kV substation for the South Wales Electricity Board.

Much air-break switchgear for 3·3 kV and 415 V was supplied to power stations for control of auxiliary plant, and h.r.c. fusegear was also supplied in large quantity.

Mercury-Arc Rectifiers

The use of mercury-arc rectifiers for large motor drives is steadily increasing. During 1950 the major applications were to steel mills for main mill drives, some using grid control for starting and a combination of grid control and on-load tap changing for speed variation. Typical orders for rectifiers in this class of duty covered two 3,300 kW 0/300 to 660 V d.c. equipments, one of 800 kW for 0/440 V d.c., and four 1,000 kW 500 V equipments. At a large South African steelworks pumpless rectifiers totalling 7,500 kW were commissioned during the year for operation at 440 V, and delivery of three 1,500 kW 600 V equipments for main mill drives was made to an important British steel mill.

Traction supplies continued to exercise the rectifier department, and during the early part of the year six 2,000 kW 3,000 V equipments were supplied for the electrification of a section of the Estrada de Ferro Santos a Jundiai, Brazil.

High-power radio broadcasting provided a steady call for rectifiers of 10,000 to 15,000 V d.c. An unusual order was for a grid-controlled

The 60 MW turbo-alternator set in Stourport B power station, seen from the alternator end. This set, described in our issue of June 22, 1950, has the higher steam pressure of 1,250 lb/sq. in. at a temperaure of 950° F

pumpless rectifier to feed a large electro magnet at 1,000 V d.c., providing intermittent pulses of 4,000 amp.

Industrial Plant

Many large motor drives were installed for steel rolling mills. Of these the largest was a hot mill reversing drive for the 45 in. slabbing mill at the Abbey Works of the Steel Company of Wales. This equipment is the first twin drive in the British steel industry and the largest reversing drive in Britain. The peak h.p. rating is 27,600, the speed 40 to 80 r.p.m., and the maximum torque 3,600,000 lb/ft.

Equipment was also installed in John Summers' works near Chester and to the British Aluminium Co.'s works at Falkirk.

Abroad, a reversing drive for a slabbing mill was delivered to the South African Iron and Steel Corporation's Vereeniging works.

Orders for mine hoists and haulage equipment from the N.C.B., South Africa, West Africa and India have been on an increasing scale since the beginning of 1950. The equipments vary between 65 and 4,000 h.p., and the majority are a.c. driven.

Textile electrical equipment has also been in great demand, many thousands of high-torque motors for fully automatic looms being on order.

An unusual machine being built for Australia is a 25/50 c/s frequency converter. This machine is 63 ft long and comprises a 37,500 kVA 50 c/s salient pole machine 0·8 p.f. coupled to a 30,000 kVA unity p.f. salient pole machine. A slipring induction motor for starting, two main exciters and two pilot exciters are included, all being in line with the large alternators. The speed of the set is 750 r.p.m. and synchronising is facilitated by constructing the stator of the 50 c/s machine so that it can be rocked through an angle of 45 mechanical degrees, and by making the field systems of both machines capable of being reversed.

Traction

Large orders for traction equipments and electric locomotives include 20 complete 3,600-h.p. 3,000 V d.c. locomotives for Spanish National Railways, and 60 locomotives part equipments; 17 complete 2,400, 1,500 V d.c. locomotives for Victorian Government Railways; 45 350-h.p. Diesel-electric shunting locomotives for British Railways on Eastern and London Midland Regions; 124 360-h.p. 600 V d.c. complete motor-coach electrical equipments, and 64 non-driving trailer equipments for B.R. (Southern Region), and four 350-h.p. Diesel-electric locos for I.C.I.

The 15 5 ft 3 in. gauge 3,000-h.p. 3,000 V d.c. locos for Brazil, made in conjunction with Vulcan Foundry, have been delivered, as were also 14 660-h.p. Diesel-electric locos to Tasmania and 10 400-h.p. Diesel-electrics to the Netherlands Railways.

overseas news

Malta's Problem

Until additional generating plant is installed further blocks of loads cannot be added to the Malta electricity system, Mr. A. A. Falzon, manager of the Water and Electricity Department, states in his annual report, just published. The decision to withhold connection was made some little time ago, thus, by the end of the financial year, a total of 1,573 applications for a supply were unattended. Steps have already been taken to obtain additional generating plant, as we have recorded. Mr. Falzon records that notwithstanding the manifold repairs and overhauls undertaken during the year under review to the existing plant with a view to increasing its efficiency and obtaining the highest possible output from it, the load on the generating station reached a figure which was beyond the capacity of the existing machinery. The action to refuse connection was made to avoid a general breakdown. Referring to the extension of street lighting, Mr. Falzon states that a plan was drawn up to install high-pressure mercury vapour lamps along the important thoroughfare from St. Anne's Square, Floriana, across Portes-des-Bombes to Spencer Hill down to Cross Road, Marsa, but the work had to be postponed owing to the power position. A further 1,023 street lamps were installed during the year, however.

Mica Mining

The view that Australia has mica deposits sufficient to meet her own needs and to develop an export market, was expressed recently by the manager of the Federal Government's mica pool. At present, Australia is drawing nearly half of her requirements from abroad. The manager of the pool considers that Indian supplies will eventually give out. The Government is prepared to help anyone interested in developing mica mining in Australia on a commercial basis. Most of this comes from the Hartz Range area, north-west of Alice Spring in Central Australia.

Delay at Sydney

Shedding further light on the Sydney blackout troubles, it is now disclosed that two complete 50 MW turbo-alternators have been lying idle in that city since June, 1949. These are for installation at the new Pyrmont station, which is not now expected to be in operation before early next year. Boilers, pipework and valves have delayed the work to some extent, but this plant is now on site, we understand, and it is only the local constructional work which is holding up completion. It is also understood that two more turbo-alternators for the next stage of Pyrmont are completed and ready in this country for shipment.

Manitoba's New Plan

New legislation providing for a reorganisation of the electricity supply industry in Manitoba is to be introduced shortly, the Premier, Mr. Campbell, announced last Thursday. This proposes to arrange for the purchase of the assets of the Winnipeg Electric Co., and to establish a power pool among the remaining electricity generating systems. The city of Winnipeg is to be permitted to retain its city hydro for the time being (as the municipality has for long advocated), but will be required to join in the power pool to be administered by the Provincial Hydro-Electric Board. The chief objective of this Board, apparently, will be to equalise the price of electricity to consumers by pooling both high- and low-cost power. It may be recalled that the best hydro-electric sites for low-cost power have already been developed, and production costs of the Provincial Government's Pine Falls project, now under construction, are relatively high. It is further anticipated that unless new generating facilities are quickly developed, a power shortage is imminent. The Pine Falls scheme is already behind schedule, original plans being for two 19,000 h.p. generators to be in operation in November, 1951, but unfavourable conditions have hindered progress. The Premier's announcement means that the Government has decided to proceed with a modified plan recommended by the commission under Dr. Hogg, which, in 1948, called for provincial power monopoly. The Premier stated that the Government will facilitate the purchase of the Winnipeg Electric Co.'s transport, gas and electricity distributing facilities, subsequent control of which is to be exercised jointly by the Province and the city of Winnipeg. No figure is given of the compensation to be paid —the company's gross assets at the end of 1949 amounted to nearly $92 millions.

Big Order

A contract for supplying six 105,000 h.p. turbines for the new Sir Adam Beck generating station of the Hydro-Electric Power Commission of Ontario has been awarded to the Dominion Engineering Co., Ltd., of Lachine, Quebec. Mr. R. Saunders, chairman of the Commission, has announced that an early start will be made in the development which will add 600,000 h.p. to the Commission's Southern Ontario system. Cost of the project, to take to 1954 to complete, is expected to amount to £157,000,000.

Spain's Production

First estimates of Spain's production of electricity in 1950, place it at 7,000 million kWh—an increase of about 1,500 million over 1949. Both years were abnormally dry, and the increase was due partly to the installation of new machinery and partly to the larger role played by thermo-electric plants. These now account for 25% of the output.

Production Increases

The year 1950 saw increased production in a number of important industries in India, including steel, coal, electrical goods (including motors), transformers, bulbs and fans. Electric motors produced last year totalled 73,921 h.p. compared with 60,050 h.p. in 1949. Transformers, of up to 1,000 kVA and 22 kV, manufactured during the first nine months of the year totalled 149,341 kVA, as against 108,775 kVA for the previous 12 months. The increase in electric lamp production was not so great however, a total of 13,800,000 being made in 1950 compared with 13,641,000 in 1949.

Periyar Power Project

The Government of Madras and Travancore-Cochin have reached agreement regarding a scheme providing for the utilisation by the Madras Government of Periyar waters for development of hydro-electric power on the Palni Hills.

Volta Scheme

The preliminary report of Sir William Halcrow and Partners on the projects for Volta River valley has been accepted by the Gold Coast Government. The plan provides for the construction of a large dam, with an 800 MW hydro-electric plant at Adjena about 65 miles from Accra. This plant would supply power for the production of aluminium from bauxite and replace all existing private and public power stations in the Gold Coast and in the neighbouring Ashanti Province. Irrigation systems to make the Accra plains and other areas into food-producing areas are also proposed. The report suggests that, if the manufacture of aluminium is to be the main outlet for the electric power to be produced, then the scheme would be economically justified. Two dam sites are being deep-drilled to help in arriving at a final decision. The consultants estimate that 545,000 kW of hydro-electricity could be produced, with a grid system to carry any power in excess of the needs of the aluminium plant to the Sekondi and Takoradi mining areas and Kumasi.

A Record Year

New Zealand's power supply authorities generated the record figure of 3,030 million units during the year ended March 31, 1950—1,600 kWh per head of population. The former figures, states the Abstract of Statistics, just published, was 200 million more than the previous year, although there was no major increase in generating plant. The main reason for the increase in units generated was that Karapiro hydro-electric station was in full-scale operation for the whole of the period. In the previous year it was not working at full capacity until the last few months.

State hydro-electric plants in the North Island generated 1,818 million units, and those in the South Island 871 millions. State fuel plants generated 48·85 million units—6 million more than in 1948-49. Hydro generation accounted for more than 96% of the total units produced. Although the total power available for consumption in 1949-50 was 9·4% greater than in the previous year, the increasing demand pressed heavily on the supply. Retail sales totalled 2,404 million units, an increase of 9½% over the corresponding figure for 1948-49. The number of retail consumers increased during the year by 21,205 to 554,554. In 1948-49 the increase, however, was 21,650. Units sold per consumer in the year ended March 31, 1950, were 4,335 compared with 4,271 in the previous year. Of the total power sales last year 57% was for domestic purposes, and, in conclusion, a total of 4,754 persons were employed in the supply industry.

Electrification

Indicative of the high degree of domestic electrification achieved in New Zealand are the latest figures concerning the Thames Valley Electric Power Board, in the North Island. Here, with 16,000 consumers, there are 9,400 water heaters and over 6,000 electric cookers connected. Water heating, both domestic and dairy, accounts for about half of the power used in the Board's area. Domestic water heating consumes 25·9% and dairy water heating 23·24%, with domestic lighting and heating accounting for a further 22%. There are 9,000 farm motors connected, including 4,000 on milking machines.

Honduras Scheme

In Honduras, the Rio Lindo (Lake Yojoa) hydro-electric scheme is being seriously considered, it being suggested that priority for the work should be given over other constructional jobs. According to a survey made by the American firm, Sanderson and Porter, provision was to be made for an initial development of 7,500 kW, and the erection of a transmission line to Tegucigalpa. If all the water power in the area concerned were utilised it was estimated that 65,000 kW could eventually be obtained. The initial estimate was calculated on the understanding that the biggest individual user would be the United Fruit Co., but agreement could not be reached regarding the price per unit the company would be willing to pay. Consequently a reduced project has been worked out to take in Tegucigalpa, San Pedro Sula and intermediate places, the Fruit Company to continue using its own power in the plantation areas.

PERSONALITIES

IN THE INDUSTRY

Recently appointed power station superintendent at the new Blackwall Point generating station, London Division of the B.E.A., is **Mr. A. G. Cox,** ASSOC. I.E.E., who since 1946, has served at Barking power station, being mechanical maintenance superintendent there for the past four years. He began his career in the industry in 1920, with the Folkestone Electricity Supply Co. (a County company), as a pupil to the late Mr. Thomas Hesketh, the engineer and manager, and stayed with that undertaking till the end of 1945, holding the position of generation engineer from 1933 onwards. He was transferred to Barking power station in 1946 as part of the post-war reorganisation of the County group of companies.

The Council of the City and Guilds of London Institute has conferred the Fellowship of the Institute on **Dr. R. L. Smith-Rose,** A.R.C.S., D.SC., PH.D., D.I.C., M.I.E.E., F.P.S.I., director of radio research at the D.S.I.R., and **Mr. M. T. Tudsbery,** C.B.E., M.INST.C.E., civil engineer to the B.B.C.

Mr. N. Garside has been appointed a director of Ada (Halifax) Ltd., the washing machine manufacturers.

Mr. J. S. Addyman

We learn that **Mr. J. S. Addyman** has been appointed to the board of H. J. Baldwin and Co., Ltd., as sales director of the company. He is well known in the industry, for he was nominated the London office and area manager in 1930, shortly after joining the company.

Formerly principal secretarial assistant at the North Western Electricity Board's No. 3 sub-area headquarters at Oldham, **Mr. H. Renshaw** has been appointed secretary of that sub-area in succession to the late Mr. F. Sharpe. He has served with the Oldham undertaking since 1914, being deputy commercial superintendent prior to nationalisation.

Mr. T. G. N. Haldane, M.A., M.INST.C.E., M.I.E.E., M.CONS.E., partner in Merz and McLellan, and **Sir Alexander Fleming** are two members of the technical advisory panel in London, of the Scottish Council (Development and Industry), recently set up, under the chairmanship of **Sir Alexander McColl,** with **Mr. A. W. Morrison,** manager of the chemical carbon division of Powell Duffryn Carbon Products, Ltd., as honorary secretary of the panel.

Returning from attending the World Power Conference in India, **Lord and Lady Citrine,** together with other representatives of the B.E.A. **Messrs. G. R. Peterson, J. Warnock, R. Y. Sanders** and **C. A. Cameron Brown,** are due to arrive at Tilbury in the *Himalaya*, on Saturday next. Most of the other U.K. delegates, including **Mr. R. Bate,** of Brush Electrical Engineering Co., **Mr. S. Chaplin** of Enfield Cables Ltd., and **Mr. C. H. Gray,** secretary of the International Executive Council of the Conference, have already returned, we understand, but **Sir Vincent Z. de Ferranti** is due back by air this weekend.

At the dinner terminating the Ediswan District Managers' Sales Conference at the Piccadilly Hotel on January, 31, **Mr. W. J. Locke,** Brighton office manager, received a presentation marking his 54 years' service with the company. An ardent ornithologist, Mr. Locke chose to receive a pair of binoculars to increase the pleasure and value of his hobby. Our illustration shows the presentation being made by **Mr. H. Butterworth,** managing director, on the right. Mr. Locke was born in 1881, and he started work in the Ponders End factory of the Edison and Swan United Electric Light Co. Ltd., as it was then, in 1896. During this period he had direct association with Sir Joseph Swan (then Mr. Swan). Two years later he took up duties in the Company's showroom in Queen Street, London, and subsequently in the London Sales Department and later in the Accounting Department, afterwards returning to the Sales Department to attend specially to overseas business. At the end of the first world war during which he was seconded to the Ministry of Munitions, he returned to the company and was appointed joint manager of the London office with Mr. Mumford, and later, with Mr. T. S. Read. He was appointed manager of Brighton District office in December, 1927.

Mr. W. J. Locke, left, gets his binoculars

Midland branch technical manager of Hoover Ltd., **Mr. H. H. Alderton,** was recently awarded a badge to commemorate his completion of 25 years' service with the company. He was admitted at the same time to membership of the company's "Quarter Century" Club.

Mr. H. L. Shermer, who has been associated with the Babcock and Wilcox organisation for over 50 years, of which 41 years have been spent in South Africa, has resigned from the position of chairman of Babcock and Wilcox of Africa (Pty.), but has agreed to remain on the Board. **Mr. Leif Egeland,** who joined the Board in September, 1950, has been appointed chairman.

At present general manager of the Rochdale Corporation Transport Department, **Mr. C. T. Humpidge,** B.SC.(ENG.), has been recommended by the Bradford Corporation Transport Committee for appointment as manager of the Bradford Transport undertaking, to succeed **Mr. C. R. Tattam,** who retires shortly. Mr. Humpidge, a native of Birmingham, was educated at King Edward's School and Birmingham University, and gained early training with that city's Transport Department.

Mr. C. K. F. Hague, M.I.Mech.E., A.M.I.E.E., deputy chairman and managing director of Babcock and Wilcox, Ltd., has just returned from South Africa, where he laid the foundation stone of the new £500,000 factory of Babcock and Wilcox of Africa (Pty.), Ltd., at Duncanville, Vereemying, some 35 miles from Johannesburg. The site is some 46 acres in extent. Among those present at this ceremony on February 2 was **Mr. A. M. Jacobs,** chairman of Electricity Supply Commission of South Africa.

The Council of the Institution of Mechanical Engineers has awarded the Thomas Hawksley Gold Medal to **Dr. A. T. Bowden** and **Mr. J. L. Jefferson,** of C. A. Parsons and Co., Ltd., for their paper entitled "The Design and Operation of the Parsons Experimental Gas Turbine," which was considered the best paper submitted during 1950.

Mr. F. J. Ashley

E. K. Cole Ltd., announce the appointment of **Mr. F. J. Ashley,** as technical sales representative for the firm's car radio section. He has been with Ekco since January 1947, serving in the Development and Engineering Department.

Mr. W. M. E. Mirams has been appointed engineer-manager of the Taranaki Electric Power Board, New Zealand, in succession to **Mr. B. H. Goldsmith.** Mr. Mirams was previously engineer to the Opunake Electric Power Board.

Mr. A. B. Gibbons, centre, receives his gifts

A buffet dance recently held at Bush House Restaurant by the Social Club of Nalder Bros. and Thompson, Ltd. was marked by a presentation to **Mr. A. B. Gibbons,** A.M.I.E.E., director and secretary, on the occasion of his retirement from the company. The presentation took the form of an illuminated address, together with a television receiver from the directors and a radio-gramophone from the employees. Our accompanying photograph, taken on the occasion, shows **Mr. A. G. O'Neill,** M.I.E.E., chairman and managing director, left, making the presentation to Mr. Gibbons, with **Mr. D. W. Nalder,** director and secretary, on the right. Mr. O'Neill in his address congratulated Mr. Gibbons on his achievements since entering the service of the company 45 years ago, having been apprenticed at the Queen Street Works, in the City of London, and serving in the Works and Drawing Office, rising to chief draughtsman and assistant general manager. He was appointed to the board as director and secretary in 1935, holding that position until his retirement.

Finding a suitable successor to **Mr. E. F. Hall,** A.M.I.E.E., who is shortly retiring from the position of station superintendent at Brimsdown generating station, Eastern Division, B.E.A., has obviously not been easy, but the selection of **Mr. J. Newton,** A.M.I.Mech.E., A.M.Inst.F., is a wise one, for not only has he been in charge of the Valley Road, Bradford, high-pressure plant, but he has also had considerable experience at Brimsdown. Mr. Newton was apprenticed with Richardsons, Westgarth and Co., gaining technical education at Wade's Engineering Academy, Constantine's Technical College, Middlesbrough, and serving in the Mercantile

Mr. J. Newton

Sir Harry Railing, right, presents the cup

Marine from 1922 to 1929, successively as fourth, third and second engineer. From 1929 to 1939 he was charge engineer at I.C.I.'s Billingham power station, and in the latter year took up a similar post at Brimsdown, which he held till 1947, when he went to Valley Road, Bradford, as station superintendent. Mr. Newton returns to Brimsdown about the middle of next month, to succeed his old "chief," who is to retire after 41 years' service in the industry, most of it at Brimsdown.

The end of April will bring the retirement of **Mr. R. Liddlelow,** the first officer to be appointed by the State Electricity Commission of Victoria, who rose to become the principal officer of the organisation. Mr. Liddelow was appointed commercial manager of the Commission in 1928, and three years later became manager, a post he has held for the past twenty years. The Commission has now announced that **Mr. W. H. Connolly,** B.Com., A.M.I.E.Aust., at present assistant to the general manager, will become assistant general manager, responsible for all engineering activity, and **Mr. W. J. Price,** now secretary and administration head, is to become commercial manager, responsible for commercial and administrative activities. In addition, **Mr. D. H. Munro,** assistant secretary, will take over Mr. Price's secretarial duties. Mr. Price, by the way, is being sent abroad to study commercial management and organisation and the administration practices of large-scale electricity undertakings in Great Britain and Canada. He will be accompanied on this trip by **Mr. R. A. K. Palmer,** engineer for planning.

At the recent annual dinner of the apprentices of the Witton Works of the General Electric Co., Ltd., **Mr. C. I. Sym-Smith,** hon. secretary, was presented with the Apprentices' Cup by **Sir Harry Railing.** Awards to the best apprentices were: drawing office, **Mr. G. E. Miller**; student, **Mr. I. Hay**; trade, **Mr. B. Kemp** and **Mr. D. Williamson.** The journal prizes went to **Mr. K. C. Parton** for cartoons; **Mr. P. R. Barton** for verse; and **Mr. P. E. Harries** for articles. In all over 400 apprentices and guests attended the function, the latter including **Mr. W. K. Brasher,** M.A., secretary of the I.E.E. In a short speech, Sir Harry Railing stressed the many opportunities ahead. The toast of the Apprentices' Association was proposed by **Mr. J. J. Gracie,** C.B.E., general manager of the Witton Engineering Works, and that of the guests, to which Mr. Brasher replied, was proposed by **Mr. P. L. Cowie.**

OBITUARY

We note the death on January 28, of **Mr. M. A. Wills,** aged 49, who had been senior assistant engineer in the Transmission (Construction) Department, North Western Division of the B.E.A. since June, 1948.

Mr. A. W. Lay, B.Sc., M.Inst.E., A.M.I.E.E., F.Inst.P., whose death on February 3 we briefly noted last week, had served with the Marconi Wireless Telegraph Co., Ltd., since 1924, and was well-known for his work in the field of diathermy and on electronic instrumentation.

The death occurred on February 12, of **Sir Allan Gordon-Smith,** K.B.E., D.L., aged 70, chairman of S. Smith and Sons (England), Ltd., and of its subsidiaries.

We learn of the death of two retired members of the staff of Erskine Heap and Co., Ltd. They are **Mr. F. Panter,** aged 86, who was the first works manager of the firm, and occupied that position till his retirement in 1931, and **Mr. D. B. Mellis,** aged 75, who started with the company in 1905 as head of the Contracts Department, and from 1913 until retiring in 1929 he occupied the position of chief electrical engineer.

We learn of the death of **Mr. A. B. Holmes,** aged 73, who retired on May 31, 1941, from the position of manager of the London sales area of Siemens Electric Lamp and Supplies Co., Ltd., which post he had held since Jan., 1926. In all he served with the Siemens concern for 52 years, commencing with Siemens Bros. in 1889. In 1908 he became chief commercial assistant in the newly-created Lamp Department, initially at Westminster and subsequently at Dalston and Upper Thames Street.

Mr. A. B. Holmes

The death is announced of **Mr. C. W. Jackson,** M.I.E.E., aged 67, who retired from the position of senior executive officer at King's Lynn to the Eastern Electricity Board in January 1949. He had served at King's Lynn since 1905, being borough electrical engineer at vesting day.

The death has ocurred at Gosforth, of **Mr. T. P. Easton,** aged 75, who retired in 1941 from the position of general manager of the Newcastle-upon-Tyne Corporation Transport and Electricity Undertaking.

CONSTANT TORQUE WINDER

New Control on Induction Motor for Mine Application

SPECIAL requirements for the application of slipring induction motors to mine winding have been cleverly met in a new G.E.C. control system by the application of current-balance technique in association with an oil servo. Practical application for the system has been found on four 4,200-h.p. a.c. winders, now being installed for the Free State Development and Investment Corporation of South Africa.

When an induction motor is used for winding duty, its torque has to be controllable, provision must be made for braking, and reversal must be readily possible. In addition, prolonged runs at low speed should be permissible, to permit of shaft and rope inspections, and any ventilation difficulties introduced by such operation must be overcome.

In the system being described, torque control is obtained by insertion of a varying resistance in the motor rotor circuit. Provision is made for reverse power braking (plugging) and also for the more economical dynamic braking, using the rotor control resistance as a variable load.

Theory

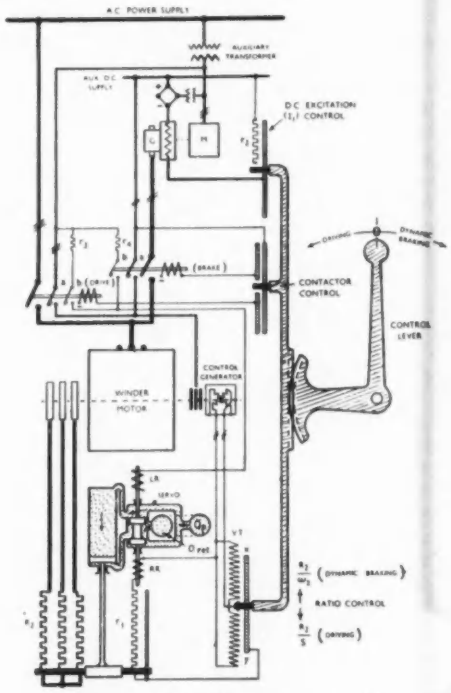
The theory of the induction motor at constant voltage shows that the torque developed is constant and independent of the speed so long as the ratio of slip to rotor resistance is kept constant. The maximum torque is independent of the rotor resistance. In the control gear this is matched by providing that, for a given position of the driver's handle, the resistance/slip ratio is kept at a steady value.

When d.c. excitation is applied to the rotor circuit in dynamic braking, for every value of excitation current there is a definite ratio between rotor resistance and speed, which will give a constant, optimum value of torque which is independent of speed. Again, this is applied by arranging the control gear to keep the best relationship between the d.c. current and the resistance/speed ratio, while avoiding the unstable portions of the torque/speed curve.

An advantage of arranging the rotor resistance to give maximum braking torque for any given value of excitation is that there is minimum dissipation of energy in the form of heat. Furthermore, operation at or near maximum torque minimises the effect of the relatively coarse steps of resistance in contactor controlled grid resistors, or of the variation of resistivity of the fluid in liquid controllers. Braking torque varies very little between consecutive resistance steps, but is steadily controllable by the d.c. excitation which is varied smoothly so as to give very fine control of braking.

Operation

Two levers provide the essential control elements for the driver. One operates the mechanical brakes, while the other, working in an "h" gate, controls the electrical plant. The double end of the gate provides forward and reverse winding, and consequently power braking, and the single end brings in dynamic braking.



Arrangement of winder control circuits

In the diagram, the control lever is seen engaged through a quadrant to a vertical rack. In the vertical position of the handle all power is off, but any movement causes the main contactors to close and energises other control equipment.

For driving the winder, the handle is put over to the left. This causes the stator of the main motor to be connected to the a.c. supply, and the sliprings of the 3/2-phase control generator to be connected to a 3-phase l.v., a.c. supply, taken from the auxiliary transformer at the top of the diagram. The control generator is driven by the main motor, and thus the resultant flux wave of its rotor revolves in space at a speed proportional to (synchronous speed minus main motor speed)—i.e. to the slip. Thus the voltage induced in the stator windings is proportional to the winder motor slip.

This induced voltage is fed to the variable auto-transformer VT, the tapping arrangement of which is altered by movement of the control handle, and the tapped voltage in turn feeds via r_1 one control coil, RR, of the oil servo. The effect of RR is to cause the servo to tend to increase the main rotor resistance R_2, and to increase r_1 at the same time. When all control current is off, R_2 and r_1 are at maximum, due to gravity control.

Another control coil, LR, is fed at constant a.c. voltage from the auxiliary transformer, and thus produces a constant force opposing that of RR. Thus at equilibrium positions of the servo, the current in RR must always be the same. The ratio of r_1 to induced voltage in VT must, as a consequence, be constant for a given control handle position, but this implies a constant ratio of R_2 to slip, which is the required condition of constant torque, independent of speed.

Braking

When the control lever is moved to the right, the winding motor stator is connected to the d.c. output of the motor-generator set. The field current of the set is controlled, via r_2, by the position of the control lever. The output of the d.c. generator is applied to the rotor of the control generator as well as to the stator of the main motor, and as a result the control generator acts as an ordinary alternator, generating in its stator windings a voltage proportional to the main motor speed. Once more the RR coil is energised by this voltage through the variable transformer VT, the tapping ratio varying with the d.c. applied to the winder motor so as to give the best relationship between this and the ratio of rotor resistance to speed.

In both braking and running operations, coil LR takes charge and lowers r_1 (and R_2). As the motor speeds up (running) or slows down (braking), the voltage generated in the control generator decreases, and R_2 is also decreased, but always at the required rate. The maximum permissible torque (usually 2 to $2\frac{1}{2}$ times full load torque) can never be exceeded.

U.S. Reports on Incorrect Switching

OUT-OF-PHASE high-voltage switching operations have been the subject of an investigation by an A.I.E.E. sub-committee since 1948. The recently published final report of the body states that there is no doubt that h.v. out-of-phase switching is a definite problem, but the indications are that in many cases a solution has been found. However, no generally applicable solution can be justified by the committee's investigations; each individual case requires special investigation to determine the most satisfactory economical answer.

As a result of a questionnaire sent to committee members, eight known cases of out-of-phase switching were revealed. Every time the circuit breaker concerned cleared the fault, even if it was damaged in the process. In most cases the damage has not been serious enough to prevent the return of the breaker to service, and the impression gained by the committee is that the cost of the most obvious precaution, the use of circuit breakers guaranteed to perform satisfactorily at twice normal voltage, would greatly exceed the cost of the damage actually caused to systems.

One partial solution suggested is the avoidance of the present trend towards using circuit breakers with lower basic impulse insulation levels on effectively grounded systems. Another promising method of attack is the application of high-speed relaying, preferably in conjunction with 3 or 5 cycle breakers.

Another line of approach is to arrange system design and operating setup to minimise the probability and effect of out-of-phase troubles. One system is built up in such a manner that it can be automatically or manually separated at one point by a predetermined group of switching operations. A plug board is constantly arranged to trip any desired group of circuit breakers in the event of instability.

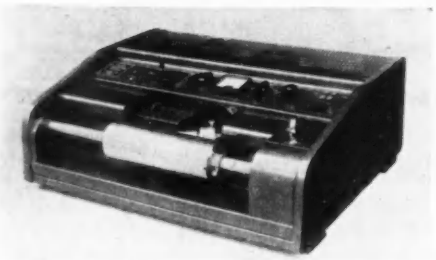
The report states (with reference, of course, to the United States) that the general trend in system growth and interconnections is gradually increasing system instability and reducing the causes of out-of-phase switching trouble.

The BUYER'S *Column*

Pictures by 'phone

OUR illustration shows the latest type of picture transmitter designed by MUIRHEAD AND CO., LTD., Elmers End, Beckenham, Kent, for operation on telephone circuits.

This is the Type D-601-A. The quality of the received pictures when this unit is used in conjunction with a Muirhead-Jarvis receiver, is in our opinion, of a very high standard.



Muirhead's D601A transmitter is a compact unit

In general the D-601-A transmitter comprises a power unit, electronic equipment and scanning gear, built into a single compact unit. A telephone handset is provided. Designed to conform with the recommendations of the C.C.I.T. the machine may be used with any Muirhead receiver or other receiver similarly standardised. The equipment may be used over any telephone line and operates from a.c. mains. Maximum pictures size 8 in. by 7·6 in. Weight complete 70 lb. Dimensions 21 in. by 16 in. by 7 in. high.

Price Readjustments

CONTINUED shortage of basic materials and the consequent rise in prices has caused the announcement of re-adjusted price levels by seven more manufacturing companies.

BYLOCK ELECTRIC LTD., South Street, Ponders End, Middlesex, announce that the Triplex vacuum cleaner now costs £13 13s., purchase tax £3 6s. 6d.; the "Zephyr" hair-dryer sells at £3 7s. 6d. and purchase tax of 16s. 6d.; the "Streamline' hair-dryer is priced £3 12s. 6d., purchase tax 17s. 8d.; and the TB214 hand-dryer costs £21 (no purchase tax).

PARNALL (YATE) LTD., 43 Park Street, London W.1, attribute their 10% price increase on the price of their models E.C.10 and E.C.12 cookers to the continued rise in cost of raw materials and certain other factors. The company points out that this increase, first alteration since these models were introduced, is applicable to all cookers of these types despatched from the works on and after February 1.

Radio and television price increases have been published by PHILIPS ELECTRICAL LTD., Century House, Shaftesbury Avenue, London W.C.2, and by ACE RADIO LTD., Tower Works, Tower Road, London N.W.10. In the case of Philips' receivers, the 603A radiogram is increased to 75 gns. (tax paid), the 1502U 12 in. table television set is 62 gns. (tax paid), the 1800A projection TV model is now 96 gns., and the 704A projection model is now 136 gns. tax paid, whilst Ace prices, with effect from February 19, are as follows: Minnigram, a.c., 55 gns.; d.c., 59 gns.; three-speed, 60 gns.; Mayfair one-speed model is now 72 gns., and the three-speed model 77 gns.

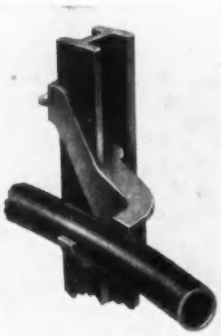
EASIPOWER LTD., 213-215 Gloucester Place, N.W.1 announce certain modifications in prices of their products. The toaster is now 47s. 6d., the Easipower kettle 47s. 6d., and the "99" and "99U" irons are now priced 37s. 6d. and 39s. 6d. respectively. Both iron models now incorporate a pilot light. Prices of the Easipower mixer, heat test meter and iron stand remain unchanged.

PREMIER ELECTRIC HEATERS LTD., Keeley Street, Birmingham have sent us a copy of their general leaflet which gives revised list prices as from February 8, 1950, whilst REVO ELECTRIC CO., LTD., Tipton, Staffs publish advances applicable to Revo lighting material as from February 12. These amount to 100% and 10% and 125% and 15% advances on most items. List No. is 774/2/51.

Why not use the Wynip?

A CLEVERLY designed clip for supporting all kinds of pipes, cables, pulleys, platforms has now been marketed by FOLLSAIN WYCLIFFE FOUNDRIES LTD., Lutterworth, near Rugby.

Its simplicity is probably its strongest selling point—to fix the "Wynip" the workman places it in position on the girder and taps it home. Result is a clip gripping like a limpet and able to support a load of one ton easily. Any load greater than this merely causes the clip to bite more deeply into the girder flange. No nuts or bolts are needed; removal is simple, a few sharp taps on the underside will release the "Wynip." Cast in one piece from black-heart malleable iron this clip should find a ready sale on the market.



The "Wynip" scores full points for its simplicity

D

Hurseal Marine Radiators

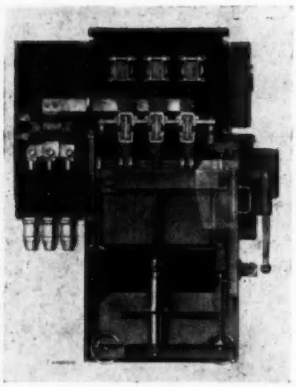
A NEW development by HURSEAL LTD., 229 Regent Street, London W.1, is the oil-filled, hermetically sealed, electrically heated radiator for marine use.

These radiators can equally well be applied to industrial use, but, while the construction is basically the same as the domestic Hurseal radiators, they have in addition an air- and water-tight connector box which encloses a thermal cut-out and condenser for d.c. working.

The radiators are principally made for bulkhead fixing and their main object is to afford additional comfort for officers and ship's company.

Brush 600 V Type V.U. Switchgear

A NEW publication No. 41009, received from the BRUSH ELECTRICAL ENGINEERING CO., LTD., of Loughborough, deals with 600 V metal-clad vertical plugging switchgear type VU. Designed primarily for heavy industry where a number of low voltage heavy current circuits are to be controlled, these units are available in 1,200, 2,000 and 3,000 amp ratings and an equivalent rating of 30 MVA at 400 V and A.S.T.A. test certificates are available.



The construction of the Brush 600 V type V.U. switchgear is seen clearly in this sectional drawing.

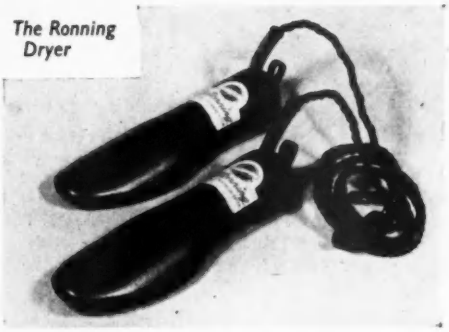
The general design of the gear is as shown in the illustration. The gear is fully interlocked and each breaker has its own lifting mechanism. Isolating contacts are of the dumbbell pattern, fully self-aligning, with silver inserts and shrouded springs. Hand or solenoid operation is standard for all circuit-breakers.

Cold Feet? No!

AN interesting and rather novel introduction to the home appliance market is the Ronning electric footwear dryer, which, after over a year's success on the Scandinavian market, has now been put into production in this country by RONNING AND CO., 7 York Place, Adelphi, London W.C.2.

Basically the dryer is a pair of metal "feet" in which 8 W heaters have been fitted. Perforation in the metal permits a proper circulation of hot air.

The Ronning Dryer



These dryers are supplied in one size only; suitable for all types of footwear from ladies light shoes to children's and farmers' Wellington boots. In several colour finishes for use on normal mains supplies, the dryers retail, complete with substantial first-quality flexible leads, at £1 13s. 4d. per pair, including tax.

TRADE PUBLICATIONS

SWITCH FUSE UNITS. No. 64 issue of the "Wylex Armchair" news sheet of Geo. H. Scholes and Co., Ltd., Wylex Works, Wythenshawe, Manchester, gives details of a new range of Wylex fuse units.

NICKEL ALLOYS. New issue of "Wiggin Nickel Alloys" by Henry Wiggin and Co., Ltd., Wiggin Street, Birmingham 16, has a variety of articles dealing with the uses of nickel-containing materials in industrial heat-treating and process equipment.

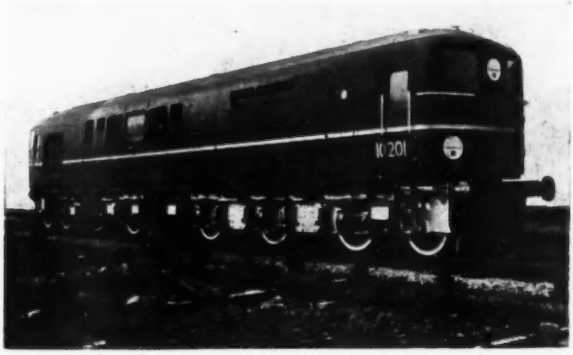
ELECTRICAL EQUIPMENT. The latest wholesale electrical catalogue issued by Wm. Dibben and Sons, Ltd., 103 St. Mary's Road, Southampton, is indeed a comprehensive volume; 220 pp. of valuable illustrated information of this nature are an asset to the dealer.

POWER RECTIFIERS. This subject is dealt with quite adequately in a brochure B.1590 by The Electric Construction Co., Ltd., Wolverhampton, England. Issued with the brochure is a questionnaire designed to assist potential buyers in their choice of equipment.

DOMESTIC IRONS. Elexcel Ltd., Victor Works, Liverpool 14, have issued a colourful little pamphlet illustrating the "Xcel" range of domestic electric irons.

FLUORESCENT LAMPS. A recent issue by Ekco-Ensign Electric Ltd., Southend-on-Sea, Essex, is a leaflet dealing with Ekco's range of fluorescent tubes in 5 standard shades with three new colours.

LIGHTING FOR SELLING. This is the title of an attractive coloured brochure issued by Thorn Electrical Industries Ltd., 105 Judd Street, London W.C.1, which gives an interesting survey of Atlas coloured and normal fluorescent lighting in store and shopwindow lighting.



British Railways (Southern Region) complete first of three 1,600 horse-power high-speed diesel-electric locomotives for passenger working only, using English Electric generation, control and traction equipment

Diesel-electric Locomotive for Southern Region

THE attention being paid to diesel-electric traction for main-line working is now further exemplified by the Southern Region's locomotives Nos. 10,201/2. Of these, No. 10,201 has recently been completed and details are now available. In all, the Southern Region is building three diesel-electric locomotives, but the description which follows applies to the first two only.

Power Unit

The power unit consists of an English Electric 16 S.V.T.-type diesel engine—similar to those used in Nos. 10,000 and 10,001 on the Midland Region—direct coupled to a 750 r.p.m. d.c. generator which has a maximum output of 900 volts, 3,000 amps. The one-hour rating of the diesel is 1,750 b.h.p. with a continuous rating of 1,600 b.h.p. Three diesel speeds are selected by solenoid-operated valves; 435 r.p.m. (idling), 600 r.p.m. (intermediate) and 750 r.p.m. (maximum).

The generator is a single-bearing machine direct coupled to the crankshaft. It is a d.c. 8-pole machine, self-ventilated, and is provided with two separately excited field windings and a series decompounding winding, which is also used when the generator is motored from the battery for starting purposes.

Normal construction is used for the armature, the laminations being keyed on to a steel spider which is pressed on to the shaft. An extension of the shaft carries the overhung auxiliary generator armature.

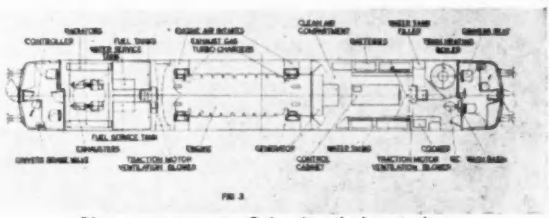
Continuous rating of the machine is 1,155 kW (1,650 amps at 700 volts) and one hour rating is also 1,155 kW (1,750 amps at 660 volts).

Auxiliary Plant

The auxiliary generator is without bearings, the armature being carried on the main generator shaft extension, and is a 6-pole d.c. shunt-excited machine. Continuous rating is 340 amps 135 volts and one hour rating 385 amps 135 volts, available over the whole speed range of 430 to 785 r.p.m.

The control equipment is located on a centrally-placed control frame which carries the relays, contactors, switches and fuses. An English Electric load regulator is employed which makes adjustment of one main generator field to suit the load demand. Field weakening is also fitted to enable speeds up to 80 m.p.h. to be attained.

Six type E.E. 519/4D series-wound nose-suspended axle-hung traction motors are used, driving three axles on each bogie through single-reduction straight spur gearing with a ratio of 52:21. The motors are connected in pairs in series across the main generator and are wound for a nominal 400 volts.



Plan arrangement of the diesel-electric loco

Testing Radio Valves

Modern Developments in Practice and Technique

THE extension of electronics to purposes other than entertainment has made the performance and life of radio valves of great importance. Methods of estimating the life and the testing procedures developed over the last 25 years were given last week to the I.E.E. Radio Section in a paper entitled "Radio Valve Life Testing," by Mr. R. Brewer.

Reasons for Failure

Valves failed for three principal reasons: emission failure, mechanical defects, and electrical defects. Theoretically, the ultimate life of a valve was reached when a large proportion of barium oxide had been evaporated from the cathode coating, resulting in loss of emission. In practice, valves usually failed before this point had been reached, through poisoning of the cathode by gases evolved in use from the other electrodes.

Mechanical faults included such defects as open circuited heaters, inter-electrode short circuits and disconnections; and electrical troubles covered such items as the development of leakage paths, the onset of grid emission and gas current.

Some of these faults could be checked in course of manufacture, but the larger number occurred during the working life of the valve. In order to check the latter, the manufacturer had to carry out life-testing by running samples under controlled conditions for several hundreds of hours.

Statistical Checking

Owing to the fact that receiving valves were generally produced in large numbers on long production runs, a powerful statistical analysis had been developed which enabled the manufacturer, by testing a comparatively small number of samples, to obtain data generally applicable to the batch. However, owing to the expense of life-testing, the sample taken was generally smaller than that required for a full mathematical statistical analysis, and a convenient unit was four valves from one day's production. When the results were assessed by engineers familiar with valve design and production problems, it had been found that a sample as small as four valves out of a month's production could give significant indications.

The normal duration of life tests for receiving-type valves was 500 hours, but some types were run for 1,000 to 2,000 hours. A complete set of characteristic measurements was made on each valve at 0, 20, 100, 200 and 500 hours. The reason for the higher frequency of checking at the beginning of the test was that most valves showed greater characteristic changes during the first 100 hours than subsequently.

In order to simulate as far as possible all the circumstances under which the valve might be used in practice, the policy generally followed was that of stressing the valve to its maximum rating simultaneously on as many parameters as possible, which probably represented a more severe loading as that in the majority of radio receivers. Thermal effects were taken into account by running the valves in a horizontal position, except where this was specifically prohibited.

Switching Cycles

Since the majority of receiving valves were used in equipment which was operated intermittently, this class of valve was subjected to regular switching during the life test. In most types, the heater supply only was switched, the h.t. supply being left on continuously. A typical switching programme was to run the valves continuously for the day period (10 hours) and to switch the valve off for five minutes per hour during the night period (14 hours). This gave nearly 23 operational hours each day, so that a 500-hour life-test would take a total time of about 22 days to run, and subject the valve to about 300 switching cycles.

Owing to the severe conditions of the life test, the manufacturer regarded the evidence derived from it as the most pessimistic report upon his product.

The paper then continued by describing the equipment generally used for the life-testing of valves, and concluded by giving a general appreciation of the problems of life-testing. The fundamental problem of all life-testing was to develop reliable techniques for accelerating the test, and some ideas were given on the subject. It was, however, emphasised that in view of the parameters involved, considerable correlation work was required before the actual life-test could be shortened.

THE WEEK

COMMERCE *in news* INDUSTRY

Coal Prices may affect Tariffs

THE B.E.A. is asking Area Boards to submit proposals which will spread the increased cost of coal among all consumers. The rise in coal prices, states the B.E.A., will add some £7½ million a year to the cost of electricity generation. Part of this increase will be passed on automatically to those consumers, mainly industrial, supplied on tariffs that include coal-price adjustment clauses, but this will still leave about £3½ million to be found from other sources. There is no margin to cover this outstanding amount in present tariffs, and the Authority's request will ensure that the new burden will be taken into account with any other upward tariff adjustments which individual Boards may find necessary.

Export Licensing Controls

EXPORT licences will be required for a number of articles leaving this country under a recent Order made by the Board of Trade and which came into force on Monday. The most important commodities listed, as far as the electrical industry is concerned, are specified insulated cables and wires. Others covered by the Order include certain plastic materials, zinc and its alloys and sulphuric acid. Licences will have to be obtained for the export of zinc and sulphuric acid to all destinations, but in the case of plastic materials, cables and wires, only those countries not specified in Part II of the third schedule.

Rise in Price Index of Materials

THE January price index of materials used in the electrical machinery industry is 143·4 (June 30, 1949 = 100), an increase of 0·9% over the December figure. The latter figure has been amended to 142·2 from the provisional 142·1. This rise in the index is the smallest since March of last year.

Signals for Shedding

ADDITIONAL details have now become available of the Yorkshire Electricity Board's experiments on a radio warning system to indicate when load shedding is imminent. Three v.h.f. transmitters are available in the territory of the Board, and these are situated at Thornhill, Otley and Silsden. Their range should be sufficient to cover about one-third of the Board's area.

Prototype receivers have been made available by the G.E.C., and these will be used for initial tests in the Dewsbury district, using the Thornhill transmitter. If these trials are successful, and sufficient receivers are available, it should be possible to operate a fairly extensive warning system in the winter of 1951-52. The cost of each receiver is likely to be about £50, but it would serve up to five groups of consumers. The signal given is expected to consist of a bell ringing continuously until stopped by hand, and a light indication.

F of B Electricians Win Claim

THE committee of inquiry set up by the Ministry of Labour to investigate the unofficial stoppages on the Festival of Britain sites has recommended that the 400 electricians be paid the extra 2d. an hour demanded. The committee suggested that payments should date from January 26, the day the first strike began. Findings were announced at a mass meeting of strikers, who resumed work on Tuesday morning. It was also recommended that the 99 electricians working on the concert hall, who did not demand the increase, be paid the 2d. an hour extra.

It was found that work on the Festival sites was so important as to make the job of an "exceptional quality," and thus it was reasonable to describe the work as analogous to that at Earls Court and Olympia where the extra 2d. an hour is paid. For the majority of men the increase will mean about 8s. a week extra.

Ceiling Prices in the U.S.

THE Board of Trade is endeavouring to clarify the contents of the General Ceiling Price Regulation made in the U.S. recently, particularly as it may affect exports to that country. The regulation is a freezing order preliminary to more precise price controls, and applies to imports and exports as

The First Half-Century

The critical or engineering sense is not developed in the classroom. The student cannot be expected to know which of the assumptions underlying his mathematical work is really close to practice, and which other, although the best that can be made, is far from being true. Since applied mechanics or engineering is not a complete science, but is constantly being revised as to its data, it is not sufficient to deal with it as an abstract science having immutable laws and finally reasoned consequences; on the contrary, the young engineer must be trained to exercise a salutary scepticism as to all generalisations and to prove things in detail for himself.—*From our issue of February* 14, 1901.

well as to domestic goods. The highest prices charged for goods between December 19 and January 25 are to become ceiling prices for all subsequent sales. Some importers will be allowed to pass on increases in prices for goods received after January 26, provided contracts have been entered into before that date, but once deliveries on those contracts have been disposed of, the ceiling price reverts to base level. Methods are provided for establishing ceiling prices for new commodities. The B.o.T. advises British exporters to refer to their representatives in the U.S. before introducing any increase in price.

Off to Study U.S. Methods

TWO teams, travelling under the auspices of the Anglo-American Council on Productivity, have recently arrived in the U.S. to study the coal industry, and training for supervision in industry, on the other side of the Atlantic. The coal productivity team was the first to cross, aboard the *Queen Mary*, and included in its numbers is Mr. Ernest Loynes, chief electrical engineer with the N.W. Division of the N.C.B. One of the coal team's main objects is to study methods of increasing production with economy in manpower. Mining machinery is another important aspect of the six-week tour. Among those who travelled on the *Queen Elizabeth* to study U.S. methods of training within industry for supervisory duties is Mr. John R. Armstrong, chief education officer of Joseph Lucas, Ltd., who leads a team of 15. Mr. Arthur Palmer, technical editor and director of studies of the Electrical Power Engineers' Association, is also one of the party.

Export of Iron and Steel Goods

THE Board of Trade has announced that the export of iron and steel goods under open general licence will be permitted only if the value exceeds the value of the iron and steel content, calculated at £21 per ton. Under a similar licence, which has now been revoked, the value was £16 16s. a ton. The latest licence, which became effective on Monday, applies to goods specified in Group 6 (2) of the first schedule of Export of Goods, Control (Consolidation) Order, 1950. Enquiries concerning the licence should be addressed to the Export Licensing Branch, B.o.T., Regis House, King William Street, E.C.4.

No Decision on Division's H.Q.

IT is still undecided whether the Merseyside and N. Wales Division of B.E.A. will be allowed to build their permanent headquarters in Liverpool. It has been proposed that a new administrative building be erected on the Lower Lee estate at Woolton, with the use of an unoccupied mansion there. When the matter came before the City Council there was opposition to the refusals of permission by two committees, and two amendments to approve the B.E.A's application were moved. The first amendment was lost. The second was approved, but when put as a substantive motion, defeated. As a result, no one is at all certain how the matter stands, and Mr. A. R. Cooper, divisional controller, has himself admitted that he is in some doubt as to what the confusing proceedings at the Council meeting implied. Mr. Cooper said after the meeting that the Division wanted a permanent headquarters so that it could put down a control room that will last. Liverpool was a capital city and it was appropriate that business should be handled there. At present the Division occupies two mansions at Springwood and Clarke Gardens just outside the city.

The new dual carriageway built at Chowpatty Seaface in Bombay, a popular holiday resort which is one of the few spots in Bombay where there is a sandy beach. The old promenade proved inadequate to cope with the volume of traffic, and reconstruction provided excellent opportunities to improve lighting. Fourteen G.E.C. "Three-Eighty" lanterns have been mounted at a height of 25 ft along a strip between the carriageways. Each lantern is equipped with three 5 ft 80-watt daylight colour fluorescent lamps

Iron and Steel Scrap

AN Order increasing the Scrap Iron and Steel Merchants' trade allowance for maximum prices of scrap from $3\frac{3}{4}\%$ to 5% has been made by the Ministry of Supply and became operative last Monday. The Order is the Iron and Steel Scrap Order, 1951, S.I. 1951, No. 208, and is available at H.M.S.O.

Bristol Firm's Success in U.S.

SUCCESS in the American market is always good news to manufacturers and consumers in this country who are ever alive to the necessity of

earning more dollars. We are therefore pleased to be able to report the return to England of Mr. A. J. Newman, chairman of Newman Industries, Ltd., Bristol, after an extensive tour of the U.S., where he obtained orders valued at about £1½ million. This has added to the success the firm has achieved in its efforts to break into the American electric motor market. Having secured the orders, the firm is faced with the problem of finding raw materials and small components to satisfy the contracts. In common with other organisations, Newmans are endeavouring to cope with the metals shortage, particularly the restricted supplies of steel.

City Appeals Against Order

SALISBURY City Council is to appeal against the imposition of a surcharge of £150 incurred when they used electricity to supply the city with water. Electricity was used when machinery at the pumping station broke down and electrical stand-by plant brought into operation. This, however, contravened an agreement with the electricity supply undertaking whereby power should not be used during peak periods, but, as Ald. E. J. Case pointed out, had the stand-by plant not been used, thousands would have been without water.

Safeguarding Lifts

B.E.A.M.A. last week passed on some sound advice from the Council of the National Association of Lift Makers to help owners of electric lifts safeguard their equipment while the possibility of power cuts exists. They advise that during periods of reduced voltage, lifts should be disconnected from electricity supply by opening the main switch or circuit breaker. They add that the lifts should not be reconnected until supply voltage rises above the statutory minimum.

A Sign which Told the Wrong Story

THE appeal to "use electricity" is possibly outdated nowadays following frequent requests to economise in the use of electricity, and the decisions of many Electricity Boards to abandon promotional advertising campaigns. A neon sign bearing the appeal was erected in Eastbourne over the electricity showrooms in 1929, but its use in the past 12 years has been so spasmodic that the showrooms' new proprietors, the S.E.E.B., have decided to take it down. First there was the blackout, and after the war the sign shone triumphantly again, only to be dowsed last autumn, not only to save power but also to hide its incongruous appeal. Now that the ban on outside lighting has been imposed the sign is to be removed altogether.

New Records in Radio and TV Sales

NEW records were established during December for sales of radio and television sets. The latest R.T.R.A. index shows that sales of both rocketed during that month, and while radios reached the high average of 18·51 sets per shop, the most remarkable increase occurred in television sales, which rose from 9 sets in November to 14·2. The compilers of the index offer no explanation for the increases, but it seems likely that Christmas and the seasonal bonuses influenced the December sales. Even so, this year's figures still exceed those of 1949. Average price per customer spent on television sets was £64 16s. 2d. The average number of sets sold per shop was:—

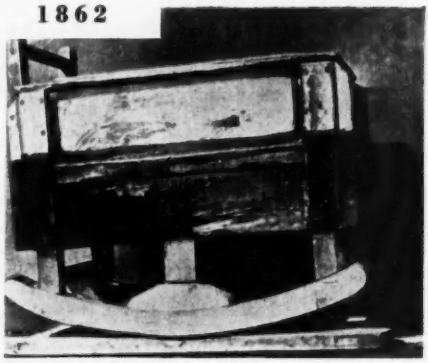
Month	1950	1949
RADIO		
October...	15.22	16.72
November	15.33	15.84
December	18.51	17.71
TELEVISION		
October...	10.75	11.77
November	9.00	11.89
December	14.2	13.18

A New Trend in Stage Lighting?

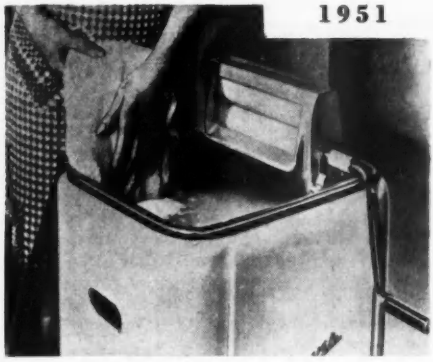
NOT long ago we reported the fluorescent stage lighting installation carried out by Thorn Electrical Industries, Ltd. at the Pleasure Gardens Theatre, Folkestone (see our issue of January 4), and stated that it was but the second of several new schemes the company had on hand. We now have details of a third scheme, now in operation at the Royalty Theatre, Chester. It is understood that the last-mentioned has been inspected by many leading members of the theatrical profession in the North and Midlands. One wonders whether these three installations are forerunners of a trend to adopt fluorescent stage lighting in all theatres, particularly as favourable impressions have also been created in the South.

A comely display of electrical appliances in a realistic setting which appeared at the Jersey Agricultural and Trades Exhibition, St. Helier, in the Channel Islands. The exhibit was by the Jersey Electricity Co.

1862



1951



Looking at the above examples of washing machines, one wonders what manufacturers in 90 years' time will think of to-day's models. The "appliance" (left) was shown by Harper Twelvetrees at the International Exhibition of 1862. A description in the catalogue states: "The cleansing process is accomplished by forcing water through the fabric by concussive power instead of acting merely on the surface. The machine for washing is exceedingly simple, and the rocking motion is easy." On the right is a modern washing machine manufactured by Hoover, Ltd.

Whilst the permanent switchboard is being made for the Royalty—the installation was again carried out at short notice—four transportable switchboards have been erected, of a similar type to those hired out by the company. The permanent switchboard, when completed, will control four float circuits, five batten circuits and side floods on both sides of the stage, and will be equipped with slow and quick motion master controls for each bank. Another important point is that the total loading is approximately 9·5 kW compared with 22 kW on the original board, a save which is particularly commendable. A notable economy has been made in all three installations carried out so far, and must be considered a tremendous advantage in these days when the utmost care is necessary in the use of electricity. David Rowan (Vidro), Ltd., of Liverpool, completed the work at the Royalty.

Public Speaking

TALKS on "Leisure Hours" by Mr. K. Prescott of the Yorkshire Electricity Board's Grimsby sub-area, and Miss Barbara Hanforth, demonstrator at the Board's Leeds sub-area, won first prizes in the men and women sections of E.D.A's public speaking competition held at Leeds recently. Coincidentally the runner-up in the women's section chose the same subject, but Mr. W. Allen of the N.E. Electricity Board changed the subject by speaking on "Electricity and Transport." There were 18 competitors altogether, six men and 12 women.

Floodlit Tennis

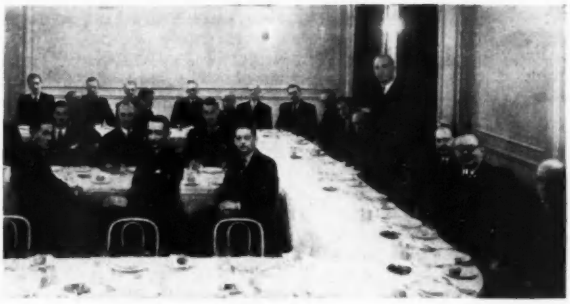
EFFORTS are constantly being made to achieve the ideal floodlit sports ground. Since the early 1930s, when professional footballers played under floodlights, numerous experiments have been made, not least among them is the latest installation at a Westcliff hotel, where a tennis court has been illuminated. Many leading players gathered at the hotel last week for the opening ceremony and were greatly impressed with results. Concrete standards, nearly 14 ft high, were erected at either end of the net and carry two 1,000-watt lamps and one 500-watt lamp. The total cost of the installation, which was by Messrs. Challis and Basten, of Harrow, was £200. The project, incidentally, had the approval of the Ministry of Fuel and Power, who ruled that it was on a par with indoor badminton, squash, greyhound racing and other similar evening events.

Pylons Arrive for F. of B. Beacon

SUPPORTS for the vertical beacon which will be the symbolic emblem for the Festival of Britain site arrived at the exhibition on the south bank of the Thames last week, following a 138 miles journey from the Hereford works of Painter Bros. We referred briefly to the beacon in our issue of October 26, and it will be recalled that the "Skylon," as it has since been named, consists of a 250 ft elliptical beam supported by pylons, steel cables and anchorages which hold it vertically suspended 40 ft above ground. The transportation of the pylons provided a problem for the makers, and a special lorry-trailer had to be commissioned to carry the 70 ft long structures each weighing 6½ tons. The supply and manufacture of this feature is the responsibility of British Insulated Callender's Construction Co., Ltd.

£44,500 for Travellers' Schools

THE 1950 appeal for the Royal Commercial Travellers' Schools raised £44,500, it was announced during the schools' Festival dinner at Grosvenor House, London, recently. The schools cost over £50,000 a year to run without any State assistance, but in spite of this high cost, the Board of Management has decided to go ahead with repairs and renovations of the buildings.



Mr. H. Butterworth, managing director of Ediswan, with some of the company's directors, district office managers and heads of departments at the dinner which terminated the Ediswan sales conference held recently

NEWS IN BRIEF

A course of four lectures on ultrasonics is to be given at the London Polytechnic, Regent Street, by L. I. Farren of the G.E.C. Research Laboratories, on successive Fridays from March 2. Fee for the course is 10s.

The silver cup for the best radio installation in the 1951 Monte Carlo Rally was won by Mr. K. E. Carter and his team of three privately entered Humber Hawks, fitted with Marconi installations. This is the first time Marconi equipment has been featured in the Rally.

The Staff Association of Telegraph Construction and Maintenance, Ltd., held its third annual dinner and dance recently. Mr. W. F. Randall, director, who has been with Telcon 25 years, spoke of the company's growth since its early days when work was almost entirely devoted to the manufacture and laying of submarine telegraph cables.

The Lancashire Dynamo and Crypto recently received an urgent order for a fractional h.p. motor of special design from their agents in Zurich. The motor was built practically from raw material, and delivery was effected within the remarkably short time of five days.

In consequence of the recent rise in the price of coal and coke, it will be necessary to increase iron and steel prices, and an order will be made as soon as possible, Mr. Strauss, Minister of Supply, stated on Monday.

Questions in Parliament

Battersea—Grit Emission

The matter of smoke and grit emission from Battersea power station, was again raised in the House of Lords, Lord Douglas of Barloch, stressing that grit is deposited in the vicinity, at times, of the order of 400 tons per sq. mile a day. In reply, Lord Macdonald of Gwaenysgor, Paymaster General, said that the position was constantly under review, and the chief alkaline inspector of the Ministry of Fuel and Power had visited the station from time to time, and would do so again in the very near future.

Cables Over Avon

The Minister of Fuel and Power was asked if he was aware that some h.t. cables, of the Midlands Electricity Board, erected over the River Avon, were not sufficiently high to prevent the possibility of ships' masts hitting them; and if he would take steps in the matter? Mr. Noel-Baker replied that he had not sufficient information, but was making inquiries.

Compensation

Stating the insurance companies did not cover accidents caused by power cuts, Brig. Prior Palmer asked Mr. Noel-Baker what provision he proposed to make to ensure compensation was payable to individuals in such cases? The Minister said he had no evidence that the insurance companies refused to issue policies covering such accidents, neither had he heard of any case of personal injury but he offered to consider any evidence, pointing out that such people would have the normal benefits under the National Insurance system, and, in a factory, the 1946 Act.

Display Lighting

Restrictions imposed by the recent Advertisement Lighting (Prohibition) Order were expected to be lifted by the middle of April, Mr. Robens announced, when Col. Crosthwaite-Eyre had moved a motion to annul the Order. Mr. Robens explained that it was necessary to make certain that the stocks of coal at power stations were as high as possible so that, should bad weather come, wholesale cuts, which would be disastrous to industry, need not be made. Measures taken in the past few weeks had achieved the result intended—stocks were now slightly higher. The amount of coal saved by the Order was small compared with total consumption, but every saving was important. He was responsible for the fuel economy campaign and he was not going to ask housewives throughout the country to use only one bar of their electric fires and to switch off the odd light and then come to the West End

and see signs glaring for no useful purpose. In moving the motion, Col. Crosthwaite Eyre asked on what the figure of 50,000 tons to be saved in three months, was based. He considered the figures completely phoney, backed up by no facts at all. In this argument he was joined by Mr. Brendan Bracken who also drew attention to the anomaly of spending money inviting people to Britain to see the illuminations, when the present Order prohibited it. The privileged position of windmill generators was referred to by Col. Clarke who also asked why hydro-electric plants could not be similarly excluded from the provisions of the Order. Mr Robens answered that in the Order it was stated that a licence could be granted in such cases. If manufacturers or industrialists wanted to use water supplies they should apply for a licence. The application would be considered, and if there would be no drain on solid fuel or electrical power, it would be granted. After giving a rough calculation on the saving in coal, Mr. Robens said the Government was considering licensing to cover some areas in the north of Scotland which are not on the grid and derive electricity solely from water power.

After further debate the motion was negatived.

Import of Metal Goods

Replying to a query, Mr. H. Wilson stated that the Government had given very careful consideration to the question of restricting imports of goods using zinc, brass and copper, which U.K. manufacturers will be prohibited from making. For the time being, and pending international discussions by member countries of the O.E.E.C., however, the U.K. does not propose to apply import restrictions on such goods.

Welsh Television

The B.B.C. television station at St. Lythams, to serve Wales, is expected to cost between £330,000 and £350,000, and be completed by mid-1952, Mr. Ness Edwards stated in a written reply.

Electric Supply News

Belfast

The Corporation Electricity Committee last week decided to recommend the Town Council to proceed with the placing of contracts amounting to £4,215,750, for plant for civil work, etc., for the new Victoria power station, to be erected on a site between the Herdman and Victoria Channels on the opposite side of the lough to the existing power station. In a report by the city electrical engineer, Mr. W. J. Girvan, which was approved by the Committee, he pointed out that to avoid major power cuts in Northern Ireland an additional 60 MW of plant would be needed by 1953-54 and at least another 30 MW by 1955-56. This is additional to the 30 MW which will be available this year at Ballylumford, and the extra 30 MW next year at the Harbour power station. He stresses that during the winter peak just past, there was a 32 MW deficiency in plant. Having regard to the increasing impact on industry of the present rearmament programme, the report recommends that contracts be negotiated for boiler plant, turbo-alternator plant, h.-p. pipework and valves, and dust collecting plant, and that provisional orders be placed immediately as follows: water tube boilers and equipment, £1,204,980, Clarke, Chapman and Co., Ltd.; 30,000 kW turbo-alternators and equipment, £632,100, C. A. Parsons and Co., Ltd.; h.-p. pipework and valves, £110,250, Stewarts and Lloyds, Ltd.; dust collecting plant, £28,160, B.V.C. Industrial Constructors, Ltd.

Drakelow

The B.E.A. has received formal consent authorising the extension of Drakelow power station by the installation of two more 60 MW turbo-alternators and two 515 klb hr boilers.

Hackney

Authorisation for extension of Hackney power station has been received by the B.E.A. Two more 30 MW sets and two 300 klb hr boilers are to be installed, together with a cooling tower of 2·25 m. gals capacity.

North of Scotland

The scheme of the North of Scotland Hydro Electric Board for the erection of o.h. 132 kW transmission lines in Inverness-shire from Fasnakyle transforming station, to a new transforming station to be erected near Fort Augustus, has now been formally confirmed by the Secretary of State for Scotland. The lines will be a further extension of the grid system in the North of Scotland and will later be connected to the generating stations of the Farry and Moriston projects. Cost of the scheme is estimated at £374,000.

Scotland

The question of charges for laying electricity mains to housing estates has been raised again, this time by the Scottish Gas Consultative Council, who last week decided to draw the attention of the Minister of Fuel and Power and the Secretary of State for Scotland to proposals submitted to local authorities which, it was alleged, amounted to competition between nationalised industries. A letter from the Scottish Gas Board drew the council's attention to proposals by electricity boards, and in particular the North of Scotland Hydro Electric Board, to reduce or waive the charge for laying electricity mains to new housing schemes if the local authority would install electric cookers and electric wash boilers, or exclude gas from being supplied to the houses altogether. The letter stated that some local authorities were resisting the proposals, and others were having to accept them for economic reasons.

The North of Scotland Hydro Electric Board

has replied to these allegations by stating that it welcomes freedom of choice by tenants, but for many years, in parts of its area, local authorities have installed and are still installing nothing but gas cookers and tenants have no option but that method. The Board explains that in the economics of providing a supply, and unless there is a good demand for electricity, a contribution is necessary towards the cost of laying services.

LIGHTING SCHEMES

Bexley.—T.C. is recommended to include in the 1951-52 estimates provision for sodium lighting along three roads at a total cost of £4,250.

Enfield.—The U.D.C. Works Committee has recommended that £3,000 be included in the estimates for 1951-52, for improving street lighting.

Hinckley U.D.C.—The Lighting Committee's schemes for electric lighting in 1951 and 1952 have been submitted to the Council for approval.

Leven.—T.C. has approved a scheme to convert street lighting to electricity at a cost of £13,000.

Lincoln.—A scheme for improved street lighting on Greetwell Road between Wragby Road and the prison is to be prepared and submitted to the T.C. Works Committee. The M.o.T. has approved a scheme for improved lighting in Yarborough Road, and The Avenue, at a cost of £1,920.

March.—The U.D.C. has asked the Eastern Electricity Board to submit schemes for improved street lighting.

Margate.—An item of £5,000 for street lighting improvements, in the capital expenditure programme, has been approved.

Penrith.—The U.D.C. surveyor is investigating the question of electric street lighting.

Stoke-on-Trent.—M.o.H. has approved the borrowing of £20,357 for the installation of street lighting in the main route from Longton to Goldenhill.

Welshpool.—T.C. is to invite both gas and electricity authorities to tender for the lighting of Class "B" roads in the borough.

Company Activities

Bell Telephone of Canada Ltd.

For 1950, the net income available for dividends is $10,323,544, which is equal to $1.53 per share, as against $1.20 in 1949. Revenue in 1950, amounted to $129,844,615, an increase of 19%, and operating expenses were $101,608,805—15% higher.

British Industrial Plastics Ltd.

Group profits for the year to September 30 last amounted to £394,239, compared with £291,512 in the previous twelve months. The final Ordinary dividend is 12% making 20% (*same*). Depreciation absorbs £98,262 (*£80,704*), and the net profit attributable to the company is £111,117 (*£83,613*).

W. R. Sykes Interlocking Signal Co.

For the year to September 30 last, the trading profit, including sundry income, amounted to £8,197, a decrease of £5,887 on the previous year. Adding profit on realisation of investment and income from investment, the total is £8,282 (*£14,088*). The sum of £3,092 (*£2,743*) is placed to depreciation, £3,703 (*£3,777*) to directors' emoluments, £176 to bank overdraft, £735 (*nil*, interest on loan, provision for taxation nil (*£3,500*)) leaving a net profit of £576 (*£2,937*). Dividend on the 6% Cumulative Preference shares takes £477, leaving £24,100 (*£24,001*) carried forward. Since the end of the financial year, the shares have been sub-divided into 1s. shares, the authorised capital increased to £50,000 and the directors authorised to make a new issue. Total issued capital is now £48,700. New articles which convert the concern into a private company have also been adopted.

Dividends Declared

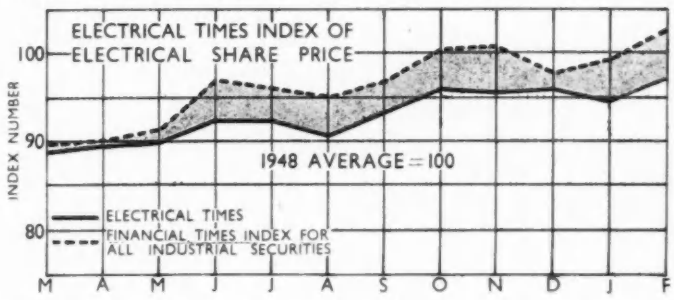
Electrical Components Ltd. Ordinary interim dividend of 7½%, payable on March 9.

J. and E. Hall Ltd. Final Ordinary dividend of 10% (7½%), making 12½% (*10%*). Net profit is £165,054 (*£113,831*).

Manx Electric Railway Co. There is again no dividend for the year to September 30 last. The operating profit, before paying debenture interest, was £4,732.

M. Mole and Son Ltd. Dividend is 20% (*10%*). Net profit for 1950 was £13,985 (*£7,755*).

Oriental Telephone and Electric Co. Interim of 4% (*same*), payable on February 20.



Electrical share prices rose during January. The Electrical Times index figure becoming 97·1 by the end of the month. During the same period the Financial Times index for all industrial Ordinary shares also rose, reaching 102·7. Both figures are based on the average prices ruling during 1948

Commercial Information

CONTRACTS OPEN

HOME

Feb. 16.—Belfast. Supply and erection of mercury arc rectifier equipment. Electricity Dept., East Bridge St., Belfast. Deposit £2 2s. (See Jan. 25 issue).

Feb. 16.—Largs. Electrical work in 46 houses on Flatt Farm site. Applications by above date to J. Dunlop Bell, Town Clerk, Municipal Chambers.

Feb. 17.—Horwich U.D.C. Supply of tungsten and sodium lamps included in lists of requirements for 12 months ending March 31, 1952. No forms of tender will be issued. T. Roscoe, Clerk of the Council, Council Offices, Horwich, Lancs.

Feb. 17.—King's Lynn T.C. Supply of electric lamps for year ending March 31, 1952. Borough Engineer, H. G. Ridler, 27 Queen St.

Feb. 17.—Solihull U.D.C. Annual tenders for year commencing April 1 includes supply of electrical fittings and bulbs. Engineer and Surveyor, 90 Station Rd.

Feb. 19.—N. Ireland. Tuberculosis Authority wants supply of electrically-heated food conveyors for various hospitals. William Harvey, secretary, 27 Adelaide St., Belfast.

Feb. 19.—Skelton and Brotton U.D.C. Electrical wiring and installation of fittings in 20 houses on Brotton Coach Rd. estate. Engineer and Surveyor, Council Offices, Skelton-in-Cleveland. (See Feb. 1 issue.)

Feb. 19.—Sunderland. Electrical installation in the crematorium at Bishopwearmouth. Borough Architect, Grange House, Stockton Rd. Deposit £2 2s.

Feb. 20.—Dewsbury T.C. Electrical installation in 112 houses on Chickenley Lane estate, 22 houses on School Lane estate and 8 in Staincliffe Rd. Office of Borough Architect and Building Surveyor, Town Hall.

Feb. 20.—Poole T.C. Supply of electric lamp bulbs, cables, fittings, etc., water heaters, street lighting lanterns and concrete columns, conduits and wiring accessories, included in annual lists for period ending March 31, 1952. J. R. Barron, Borough Engineer and Surveyor, Municipal Buildings.

Feb. 20.—Sligo C.C. Complete electrical installation in proposed conversion of the Girls' High School, Sligo, into a T.B. Hospital. Details from J. A. Kenny and Partners, consulting engineers, 44 Kildare St., Dublin. Deposit £15 15s.

Feb. 21.—Coupar Angus T.C. Electric lighting in erection of 10 houses at Middlehills housing scheme. A. F. Laing, Town Clerk, National Bank Chambers. Deposit £1 1s.

Feb. 21.—High Wycombe T.C. Thirty-two concrete lighting columns, including lanterns for 250 W horizontal MV lamps, etc., for Hughenden Rd. Particulars from Borough Engineer's Dept., Municipal Offices, High Wycombe. Deposit £2 2s. (See Jan. 25 issue.)

Feb. 21.—Rochdale. Installation of ventilating fans and ducting in Market Hall. Borough Surveyor, Town Hall.

Feb. 21. — Thingoe R.D.C. Wiring of 89 houses, including provision of light and power points. S. M. Casson, 1 Northgate St., Bury St. Edmunds.

Feb. 21.—Tynemouth T.C. List of supplies for year ending March 31, 1952, includes electric lamps and cables, lamp columns and reflectors. Borough Surveyor, D. M. O'Herlihy, 16 Northumberland Sq., North Shields.

Feb. 22.—Ipswich. Electric lighting and heating installations at aged persons' hostel, Castle Hill. Borough Surveyor, 19 Tower St. Deposit £2 2s.

Feb. 23.—Belfast. Forster Green Hospital require supply of electrical engineering materials for year ending March 31, 1952. Secretary of Hospital Management Committee, Fortbreda, Belfast.

Feb. 23.—Inverurie T. C. Electrical installation in erection of 20 houses on Kellands site. Burgh Surveyor, Town House.

Feb. 24.—Dagenham. Supply and erection of 217 Group A lighting units in Valence Ave., Rainham Rd., Whalebone Lane North, and Parsloes Ave. Borough Engineer and Surveyor, Civic Centre. (See Feb. 8 issue.)

Feb. 24.—Dublin. Supply of electrical fittings. City Engineer, 28 Castle St., Dublin.

Feb. 24.—Swansea T.C. Electrical installation in 44 flats at New St. Applications by above date to Borough Architect, Guildhall, Swansea. Deposit £2. (See Feb. 8 issue.)

Feb. 26.—Atherstone U.D.C. Supply and erection of street lighting equipment on trunk rd. A47 including concrete columns and lanterns. D. C. Smith, Engineer and Surveyor, Council Offices, Long St. Deposit £2 2s. (See Feb. 1 issue.)

Feb. 26. — Bedworth U.D.C. Supply and erection of automatic booster installation, comprising two electrically driven pumps of 60,000 g.p.h. with switchgear, etc., for Saunders Av. pumping station. C. S. B. Cooper, Water Engineer, Council Offices, High St.

Feb. 26.—Lochgelly. Electrical work in erection of 26 houses on Cooper Ha' Park site. James Gentles and Son, chartered quantity surveyors, Kirkcaldy.

Feb. 26.—Manchester. Electrical installation at Charlestown infants' school in Pilkington Rd. City Architect, Town Hall. Deposit £1 1s.

Feb. 26.—N. Ireland. Alterations in change from d.c. to a.c. supply at Holywell Hospital, Antrim. F. D. Brown and Sons, consulting engineers, 93 Ann St., Belfast. Deposit £5.

Feb. 26.—Rochester T.C. Lighting is included in road works to be carried out in Woodstock Rd. City Surveyor, 66 Maidstone Rd., Rochester.

Feb. 26.—Runcorn U.D.C. Supply of electric lamps as part of annual contracts for 12 months ending March 31, 1952, T. J. Lewis, Clerk of the Council, Town Hall.

Feb. 26. — Salford. Complete electrical installation at primary school in Summerville Rd. City Engineer, Town Hall, Bexley Square, Salford 3. (See Feb. 1 issue.)

Feb. 26.—Slough. Provision of 50 concrete columns, lanterns with 80 W mercury-vapour equipment, and erection of 10 columns and installation of equipment for street lighting in

Westfield and Hinton Rds. and Bridge Close. Borough Engineer, Town Hall. Deposit £1 1s.

Feb. 27.—Thurrock U.D.C. Installation of approx. 1,559 refrigerators (of which about 1,395 will be operated by electricity), in existing council houses. Details from A. E. Poole, Clerk of the Council, Council Offices, Whitehall Lane, Grays, Essex. Deposit £3 3s. (See Feb. 8 issue.)

Feb. 28.—Cheadle and Gatley U.D.C. Supply of electric lamps, standards and fittings for street-lighting purposes. G. P. Stanley, Engineer and Surveyor, Town Hall, Bruntwood, Cheadle. (Advertised in this issue).

Feb. 28.—Huddersfield T.C. Supply of tungsten filament and mercury-vapour and sodium lamps, and electric cables, for year ending March 31, 1952. Offices of the Borough Engineer and Surveyor, High St. Bldgs.

Mar. 3.—Rochester. Lighting of Cavendish Rd. is part of road works to be carried out there. City Surveyor, 66 Maidstone Rd., Rochester.

March 5.—Littlehampton U.D.C. Electrical installation in 18 houses and 16 houses, under separate contracts on Wickbourne estate. Engineer and Surveyor, Council Offices, Littlehampton. Deposit £1 1s.

March 7.—Dublin. Two complete sets of rectifier equipment, having output of 1,000 amp at 500 V. Also supply of one 400 kVA transformer for Port and Docks Board, Engineer's office, East Wall Rd., Dublin.

Mar. 9.—Bournemouth. Installation of No. 2 electric lifts at Town Hall. Borough Architect, Town Hall. Deposit £2 2s.

Mar. 9.—Kilwinning T.C. Tenders invited for street lighting of Trunk Road A.78 with sodium vapour discharge lamps. Burgh Surveyor, Council Chambers, Kilwinning. (Advertised in this issue.)

March 10.—Brighouse T.C. 130 concrete columns, 20 brackets for attachment to existing poles and 150 h-p. m-v. lanterns and fittings, for the Bradford-Huddersfield Road A. 641. Borough Engineer, Commercial Street, Brighouse. Deposit £1.

March 16.—Lincolnshire. Electrical work in erection of secondary school at North Hykeham, nr. Lincoln, for C.C. Applications to Council's Architect, Messrs. Watkins, Coombe and Partners, Heslam Chambers, 191 High St., Lincoln, by Feb. 21.

March 19.—North of Scotland H.E. Board. Forty miles of 132 kV steel tower o.h. line, between Beauly and Shin. Apply to Strain and Robertson, 154 West George St., Glasgow, C.2. Deposit £2 2s. (See Jan. 25 issue.)

No date stated.—Aberdeen. Electrical work in alterations at Frederick St. junior secondary school. J. A. O. Allan, Ross and Allan, Architects, 10 Bon-Accord Sq.

No date stated.—Falkland. Electrical work in 12 houses on Southfield site. Applications to A. D. Haxton and Watson, architects, Leven.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

March 10.—Uruguay. Servicio Official de Difusion Radio Electrica invites tenders for radio-electric material, recording equipment, measuring instruments, generating sets, etc. B.o.T. (Ref. CRE (IB) 52226/51).*

March 15.—Thailand. Railways Dept. in Bangkok wants 232 sets of acid batteries, 2 V with capacity of 144 amp/hr and 270 sets of same, 2 V with capacity of 102 amp/hr. Stores Manager, Chief Stores Division.

Mar. 29.—Pretoria. Supply of two 1,000 kVA 33,000/11,500 V on load tap changing transformers, three 33,000 V insulators and four 11,500 V insulators. Documents from Controller of Stores, and Buyer, P.O. Box 48, or 175, Lorentz Sq., Paul Kruger St., Pretoria.

April 12.—Sydney. Sydney County Council requires transformer winding temperature indicators. Prospective tenderers can contact Messrs. Preece, Cardew and Rider, 8-10 Queen Anne's Gate, London S.W.1.

CONTRACTS PLACED

Glasgow. Replacement with 50 c.p.s. alternator of the 25 c.p.s. alternator of the existing 10 MW turbo-alternator at Pinkston power station, Metropolitan-Vickers Electrical Co., Ltd., £31,500.

Hull. Supply of 2,000 table telephones, £7,458, of 800 bell sets with condensers, £1,189, and 1,250 bell sets without condensers, £1,645, Automatic Telephone and Electric Co., Ltd. Also 750 telephones, £3,820, and 100 with red earthing button, £528, General Electric Co., Ltd.

L.C.C. Supply and erection of 16 electrically driven mechanical scrapers for removal of settled sewage sludge from sedimentation tanks. William E. Farrer Ltd., £122,708.

Plymouth. Festival illumination in the town will probably be installed by Madge and Son, £5,627.

Your Queries — Answered

"Sunbeam" lamps, makers of? L.B.—Britannia Electric Lamp Works Ltd., 14 Sunbeam Rd., N.W.10. (19417)

"Convertogram" record player, makers of? D.E.—Thompson Diamond and Butcher Ltd., 34 Farringdon Rd., E.C.1. (19421)

"Aristocrat" fires, makers of? L.P.—M.P. Stainless Products, Kettlebrook Rd., Tamworth, Staffs. (19426)

"Columbine" irons, makers of? D.D.—C.V.A. Jigs, Moulds and Tools Ltd., Portland Rd., Hove 3. (19429)

"Admel" lighting equipment, makers of? G.D.—Associated Drawing Materials and Equipment Ltd., 28 Victoria St., S.W.1. (19412)

"Elephant" kettles, makers of? S.A.—Bescol (Electric) Ltd., Parkfield Rd., Birmingham 8. (19433)

"Acme Perfector" potato preparing machines, makers of? T.B.—Acme Eng. Co., Ltd., Acme Works, Holbeck, Leeds 11. (19438)

The above are selected from questions we have answered this week. If you have a query, send it to us.

West Bridgford (Notts) U.D.C. Supply and erection of 61 concrete columns and 140 W sodium lanterns in relighting of part of Loughborough Rd., General Electric Co., Ltd., £3,524.

Westhoughton (Lancs.) U.D.C. Approx. 175 concrete columns and installation of wiring, fittings and auxiliary equipment, also supply of refractor-type lanterns, lamps, etc., for four miles of trunk road, A6. N.W. Electricity Board, £10,205.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

B.M.W. (Sandown, I.W.), Ltd., 48 High St., Sandown, I.W. Electrical engineers, etc. Cap.: £2,000. Dirs.: S. A. F. Morley, J. C. A. Wilson, and S. B. Bones.

Desoutter Bros. (Holdings) Ltd., 73 Baker St., W.1. Manufacturers of and dealers in pneumatic and electric tools and machinery and metal goods and articles; iron masters, workers and founders, etc. Cap.: £100. Dirs.: To be appointed by subs. Subs.: Edith Sanders and Doreen Cronin, Austin Friars House, 6 Austin Friars, E.C.2.

Domestic Appliances (Northern) Ltd., 16 King Charles St., Leeds 1. Manufacturers of and dealers in electric washing and drying machines, etc. Cap.: £8,000. Dirs.: A. L. Hopton and Florence Kitchen.

Filson Ltd., 87a Upper Richmond Rd., S.W.15. Engineers, particularly as to the electric treatment of water, etc. Cap.: £100. Permanent dirs.: T. W. Dawson and R. R. Phillips.

K.G.S. Bearing Co., Ltd., 1 Birch St., Wolverhampton. Manufacturers of and dealers in ball and roller bearings, etc. Cap.: £100. Dirs.: J. Squires, C. E. Marshall, J. Squires, jr., and P. D. Sage.

Mesoncraft Processes Ltd. Manufacturers of and dealers in electrical, mechanical, electronic and atomic apparatus and accessories, etc. Cap.: £3,000. W. Kartar Singh, 53 Mount Pleasant, S. Ruislip, Middx., signs as dir.

Yorkshire Refrigeration (Bradford) Ltd., 74 Manningham Lane, Bradford. Manufacturers of and dealers in refrigerators, etc. Cap.: £3,000. Dirs.: G. P. Luckman, H. Buswell and E. Hargreaves.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	202 0 0	£196 0 0
Delivered in 2nd and 3rd month after order ...	215 10 0	—
Delivered in 4th, 5th and 6th month after order	217 0 0	—
LEAD, good soft pig (foreign)	136 0 0	136 0 0
,, ,, ,, "English" quality	137 10 0	
Delivered in 2nd and 3rd month after order, plus	7 0 0	
TIN (99-99.75%) ... ...(Cash)	1555-1560	—
,, (3 months)	1515-1520	—
ALUMINIUM, commercial purity (del.) ...	124 0 0	—
ZINC	151 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	45 10 0	—
Mild Steel Tape (0.04 in.)	26 0 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Bonnella Bros. Ltd., manufacturing electricians, 1 Bucknall St., W.C.2, have appointed Roland N. Russell, Coventry House, South Place, E.C.2, as liquidator.

Modern Redecorators and Builders Ltd., electrical contractors, have appointed Henry Darrell, Chartered Accountant, of 1 High St., Croydon, Surrey, liquidator, to whom creditors should send particulars by March 15.

Premier Electric Services Ltd. Meeting of creditors will be held at Leicester Chamber of Commerce 3 Granby St., on Feb. 20 at 2.30 p.m.

Zenith Model Co., Ltd. Resolution for winding-up passed at meeting on Jan. 29. Ronald Frederick Bendall, 126 Colmore Row, Birmingham, and Patrick John Garland of 36 Waterloo St., Birmingham, have been appointed liquidators. Particulars should be sent to the former by March 16.

First Meeting

London. Electrical Engineering and Advice Bureau Ltd. Meetings of creditors and contributories to be held at Inveresk House, Strand, W.C.2, on Feb. 21 at 11.30 a.m. and 12 noon.

Luton. Electrical and Car Services (Luton) Ltd., 144 Old Bedford Rd. Meetings of creditors and contributories at Official Receivers' Office, 6 The Parade, Northampton, on Feb. 16 at 11 and 11.30 a.m.

Release of Liquidators

London. British Electronic Appliances Ltd. Liquidator was A. W. Hunter, 185-188 High Holborn, W.C.1. Date of release, Jan. 17.

London. Dolphin Engineering Co., Ltd. Liquidator was David Morgan, 100 Park St., W.1. Date of release, Jan. 17.

London. The Eralite Manufacturing Co., Ltd. Liquidator was A. W. Hunter, 185-188 High Holborn, W.C.1. Date of release, Jan. 17.

BANKRUPTCY ACTS

First Meeting

Stockton-on-Tees. Ronald C. Alexander, trading as "Tees Electrical Installation Co., at 12 Mandale Rd., Thornaby-on-Tees. First meeting at Official Receiver's Office, 4 Bridge St., Stockton, on Feb. 16 at 11.30 a.m. and public examination at the Court House, 4 Bridge St., Stockton, on March 20 at 11 a.m.

TRADE NOTES

New Phone No. The telephone number of Wandleside Cable Works Ltd., has been changed to Battersea 2273/4.

Changes of Address. On February 19, Barlow and Young Ltd. are moving to larger offices at 55 Catherine Place, S.W.1. The telephone number remains Victoria 7373. As from March 1, the Leeds branch of Thorn Electrical Industries Ltd. will operate from 35 Aire Street, Leeds 1. Telephone 29310.

Extensions. Allen West and Co., Ltd., propose to erect another factory in Moulsecombe Way, the plans for which have been approved by Brighton Corporation.

E.W.F. Members. Newly elected members of the Electrical Wholesalers Federation are:—Wheeler Electrical Supplies (Wholesale) Ltd., 150 Burton Road, Derby, and Smith Bros. (Rotherham) Ltd., Mazeppa Chambers, Westgate, Rotherham.

BUSINESS PROSPECTS

HOME

Angus. Ten-year programme for new fire stations estimated to cost about £100,000 has been approved. Four new stations are proposed for Arbroath, Dundee, Monifieth, and Carnoustie and will rank for priority after the new Montrose station, negotiations for the erection of which are proceeding.

Barnard Castle. N.E. Housing Assoc., Metrovick House, Northumberland Rd., Newcastle-on-Tyne, is to erect 39 houses on Zetland Rd. extension.

Biggleswade (Beds). Plans approved for erection of 44 houses and 6 bungalows.

Billingham - on - Tees U.D.C. Plans approved for erection of 160 houses in Roseberry Road.

Blyth T.C. Council is to carry out £56,000 scheme for modernisation of 700 pre-war council houses. Work includes installation of electricity. Borough Engineer is D. W. Foster, Municipal Buildings, Blyth.

Bristol T.C. Construction of primary school at Park Grove, Henleaze. J. Nelson Meredith, City Architect, Eagle House, Colston Ave.

Clitheroe (Lancs) R.D.C. It is proposed to build 12 houses each at Chatburn and Whalley and 4 at Hurst Green.

Colchester T.C. Erection of 16 houses and 20 flats on Shrub End site. J. S. Orchard, Borough Engineer, 64 West Stockwell Street.

Dewsbury T.C. All trades for conversion of 40 Leeds Rd. into a dental clinic. Borough Architect and Buildings Surveyor, Town Hall.

Doncaster. Construction of nursery in Tickhill Rd. Borough Engineer, 2 Priory Pl.

Durham. R.D.C. has been asked to build 200 houses at Bowburn. Surveyor is K. G. Millar, Byland Lodge, Durham.

East Barnet U.D.C. Council has approved the expenditure of £4,604 on electrical rewiring and installations in houses on Conyers Park estate.

Friern Barnet U.D.C. Erection of 48 flats in Friern Barnet Lane and 8 at Torrington Park. B. R. Ostler, clerk, Town Hall.

Glamorgan. Erection of colleges for Further Education at Aberdare and Gorseinon. County Architect, L. R. Gower, Glamorgan County Hall, Cardiff.

Herne Bay U.D.C. Erection of 20 flats in five blocks in Victoria Park. A. S. Wilson and Partners, 8 Princes St., Storey's Gate, Westminster, S.W.1.

Huddersfield. Leeds Regional Hospital Board has approved plans for erection of a new hospital.

Keynsham (Som.) U.D.C. Council is to erect 23 houses to complete Norman Rd. estate at Saltford.

Lisburn R.D.C. Erection of 14 houses at Lissue and 16 at Islandkelly. Architects are Gamble and Maxwell, 5 University Terr., Belfast.

Macclesfield T.C. Erection of 23 houses at Weston. Borough Architect, 3 Jordangate.

Malden and Coombe T.C. Recommended to apply for sanction to borrow £105,509 for erection of 60 flats in South Lane.

Mansfield. Erection of Technical College and Selston C. of E. school for C.C. Applications to County Architect, County Hall, Trent Bridge, Nottingham.

Newcastle-on-Tyne. Conversion of house into children's home, erection of children's homes on Longbenton and Montagu estates. City Architect, 18 Cloth Market.

Norwich. Construction of 354 dwellings on South Park Ave. estate. City Architect's Office, City Hall.

Peterhead. Dean of Guild Court has approved extensions to Crosse and Blackwell's canning factory. Extensions will be built along the sea front and are estimated to cost £23,000.

Romford T.C. It is proposed to erect 10 shops and 6 flats on Gobions estate and 8 shops with 5 flats on Havering Park Estate. Also recommended to erect 28 flats in Rush Green Rd. and 22 bungalows on Poplar St. site.

Southend-on-Sea. Erection of primary school at Blenheim Chase. Architect, Municipal Buildings (Annexe), 30 Alexandra St.

South Shields. Improvements, including installation of additional electric points, are to be carried out to houses on Cleadon Park estate at cost of £9,366.

Staffordshire C.C. Plans submitted for long term capital works programme, including erection this year of the Tamworth College.

Stalybridge. Construction of 40 houses on the Buckton Vale site. P. W. Musther, Town Clerk, 127 Stamford St.

Sunderland T.C. About 5,700 houses are to be built on land added to the borough's area under boundary adjustment plan.

Stanley (Durham). Plans approved for a ball-bearing factory on Greencroft estate, Annfield Plain, for N.E. Trading Estates Ltd., on behalf of Ransome and Marles, Ltd., Newark. Architects are Napper and Taylor, 56 Eldon Place, Newcastle-on-Tyne.

Stocksbridge U.D.C. Erection of 50 houses on Stubbin Farm estate, Deepcar. Husband and Co., 388 Glossop Rd., Sheffield 10.

Tarvin (Cheshire) R.D.C. Erection of 36 houses and 2 bungalows on various sites.

Thirsk R.D.C. Tenders being obtained for erection of 21 houses and 4 bungalows in Sutton Rd. Plans by Needham, Thorp and White, 6 High Petergate, York.

Totnes R.D.C. Council proposes to build 32 houses at South Brent, and 17 on four other sites.

Waterford (Eire). Erection of 34 houses at Portlaw and 16 at Kilmacthomas. Secretary, County Offices, Dungarvan.

Welshpool (Mont.) T.C. Approval received for erection of 34 houses and 4 flats on Borfa Green site.

Woking U.D.C. Erection of 40 houses on Maybury estate. H. P. Tame, Borough Engineer and Surveyor, Council Offices.

OVERSEAS

Persia. Mr. Saeed Granfar, P.O. Box 234, 52 Avenue Arjang, Tehran, wishes to obtain sole agency of a U.K. manufacturer of dry batteries for radio and torches. He states he is able to import 100,000 cells in first year. Types required are 45 and 90 V cells for radio and also 4½ V l.t. cells, and for torches 1½, 3 and 4½ V cells.

MEETINGS TO NOTE

THURSDAY, FEB. 15

I.E.S. (Gloucester and Cheltenham Centre).—"Sodium Lamps and Their Application." A. W. Gostt, Cadena Cafe, Eastgate St., Gloucester, 6.30 p.m.

I.E.S. (Nottingham Centre).—"Street Lighting." W. R. Stevens. Gas Showrooms, Parliament St., 5.30 p.m.

I.E.E. (London Utilisation Section).—"Dimming of Low-Pressure Discharge Lamps." C. E. Williams. Savoy Pl., W.C.2, 5.30 p.m.

I.E.E. (E. Midlands Centre).—"Evolution of the Lighting Art." J. W. T. Walsh. George Hotel, Kettering, 7.30 p.m.

I.E.E. (E. Midlands Centre).—"Planning of an Electricity Board's Distribution System." G. O. McLean. Corn Exchange, Spalding, 7.30 p.m.

I.E.E. (Rugby Sub-centre. —"Rationalised M.K.S. Units in Electrical Engineering Education." E. Bradshaw. E. Midlands Electricity Showrooms, High St., Rugby, 6.30 p.m.

I.E.E. (Irish Branch). — "Fifty Years of Telecommunications in Ireland." J. W. O'Neill. Trinity College, Dublin, 6 p.m.

FRIDAY, FEB. 16

I.E.E. (N. Staffs Sub-centre).—"Review of Research in Electricity Supply." C. W. Marshall. Midland Electricity Showrooms, Stoke-on-Trent, 7. p.m.

I.E.E. (Western Centre and Swansea Sub-centre).—Dinner-dance and visit of President. Seabank Hotel, Porthcawl.

ELECT. TRADES' COMMERCIAL TRAVELLERS' ASSOC.—Annual luncheon. Connaught Rooms, W.C.2, 12.30 p.m.

SATURDAY, FEB. 17

A.S.E.E. (Manchester Branch).—"Electronics." J. E. Fielden. Engineers' Club, Albert Sq., 7.30 p.m.

MONDAY, FEB. 19

BIRMINGHAM ELECT. CLUB.—"Antarctic Exploration." Sir Raymond Priestley.

I.E.E. (London Radio Section).—Discussion on "Is there an Optimum Speed for a Gramophone Record?" Savoy Pl., W.C.2, 5.30 p.m.

I.E.E. (Mersey and N. Wales Centre).—"Electrical Installations in Large Chemical Factories." D. B. Hogg. Liverpool Royal Instn., Colquitt St., 6.30 p.m.

I.E.E. (N.E. Radio and Measurements Group).—"A Simplified Method for Checking the Orientation of the Optic Axis of Meter Jewels," and "A Sensitive Balance for Stability Tests on Permanent Magnets." S. F. Knight. King's College, Newcastle, 6.15 p.m.

I.E.E. (Western Supply Group).—"Design, Specification and Performance of High-Voltage Surge Diverters." H. F. Jones and C. J. O. Garrard. Electricity House, Colston Av., Bristol. 6 p.m.

I.E.S. (Liverpool Centre).—"Operation and Maintenance of Fluorescent Lighting Installations." G. D. Jones-Thomas and W. A. R. Stoyle. Merseyside and N. Wales Elect. Board, Whitechapel, Liverpool 1, 6 p.m.

ELECT. POWER ENGRS'. ASSOC. (Midland Tech. Group).—"The Walsall Power Station." A. E. Farmer. Midlands Elect. Board, Paradise St., Birmingham, 7 p.m.

I.E.E. (E. Midlands Centre).—Junior Members' Night. Loughborough College, 6.30 p.m.

I.E.E. (N. Midland Utilisation Group).—"Cost and Efficiency of Earthing on Low- and Medium-Voltage Overhead Line Systems." L. Gosland. Lighting Service Bureau, Aire St., Leeds, 6.30 p.m.

I.E.E. (N.W. Supply Group).—"Design of Power Transformers to withstand Surges due to Lightning." A. T. Chedwick, J. M. Ferguson, D. H. Ryder and G. F. Stearn. Also "Design and Performance of Surge Diverters for Protection of A.C. Systems." T. F. Monahan. Engineers' Club, Albert Sq., Manchester, 6.15 p.m.

I.E.E. (S. Midlands Centre and Radio Group).—"Electrical Methods of Measuring Mechanical Quantities." F. J. Woodcock. Winter Gardens, Malvern, 7 p.m.

A.S.E.E. (Central London Branch).—"Mercury Arc Rectifiers." K. B. Blake. St. Ermin's Hotel, S.W.1., 6.50 p.m.

TUESDAY, FEB. 20

A.S.E.E. (London).—"Accidents and the Supervising Electrical Engineer's Responsibilities." E. Midgley. Lighting Service Bureau, Savoy Hill, W.C.2., 6.30 p.m.

INST. OF PHYSICS (Electronics Group).—Discussion on "Electronics and the M.K.S. System of Units." 47 Belgrave Sq., S.W.1. 5.30 p.m.

WEDNESDAY, FEB. 21

A.S.E.E. (Coventry Branch).—"Interference, its Causes and Remedy." J. C. E. Pastance and E. R. Robson. Tech. College, The Butts, 7.15 p.m.

A.S.E.E. (Manchester Branch).—Quarter hour lecturettes by members on "The Other Fellow's Job." Engineer's Club, Albert Sq., 7.30 p.m.

LUTON ELECT. SOC.—"Multi-Channel Telephony."

I.E.E. (London Supply Section).—"Transient Theory of Synchronous Generators Connected to Power Systems." B. Adkins. Savoy Pl., W.C.2, 5.30 p.m.

I.E.E. (N. Midlands Centre).—"Phase/Neutral System of Supply for Rural H.V. Distribution." G. T. Garwood and G. J. Websdale. Y.E.B., Ferensway, Hull, 7.30 p.m.

I.E.E. (Sheffield Sub-centre).—"Polyphase Commutator Machines." B. Adkins and W. J. Gibbs. Grand Hotel, Sheffield, 6.30 p.m.

I.E.E. (N.W. Radio Group).—"Some Engineering Aspects of the Development of Television Broadcasting." J. L. Bliss. Engineers' Club, Albert Sq., Manchester, 6.30 p.m.

I.E.E. (N. Lancs Sub-centre).—"Electrical Equipment of Diesel-Electric Locomotives and Motor-Coach Trains." P. L. Mardis and W. G. Jowett. Harris Inst., Corporation St., Preston, 7 p.m.

I.E.E. (S. Western Sub-centre).—"Performance of the British Grid System in Thunderstorms." J. S. Forrest. Electricity Offices, Taunton, 3 p.m.

IRON AND STEEL INST.—Symposium of papers on "High Temperature Steels and Alloys." Inst. of Civil Engineers, Gt. George St., London. To be continued on Thursday, Feb. 22.

INCORP. PLANT ENGRS. (Western Branch).—"Electrical Distribution." R. H. Cobbold. Grand Hotel, Bristol, 7.15 p.m.

BRITISH INSTN. OF RADIO ENGRS. (London Section).—"Electronics and Air Transport." C. H. Jackson. School of Hygiene and Tropical Medicine, Keppel St., W.C.1, 6.30 p.m.

THURSDAY, FEB. 22

I.E.S. (Bradford Group).—"Sight and Light." J. Benson. Yorks Elect. Board, Sunbridge Rd., Bradford, 7.30 p.m.

I.E.E. (London).—Annual dinner at Grosvenor House, Park Lane, 7 p.m.

A.S.E.E. (Luton Branch).—"Flowmeters." George Hotel, George St., 8 p.m.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

"Acex." 692,413. Class 9. Switches, plugs, bell pushes, and switch fuses. J. A. Crabtree and Co. Ltd., Lincoln Works, Lincoln Rd., Walsall, Staffs.

Kub. B692,091. Class 8. Electric shaving instruments. Chilton Aircraft Co. Ltd., Hungerford, Berks.

Hi K Ceramicon. 693,949. Class 9. Ceramic electrical condensers. Eric Resistor Ltd., 2 Carlisle Rd., The Hyde, Hendon, N.W.9.

Lido. B692,372. Class 9. Wireless, television, telegraphic equipment, gramophones, batteries, cases for torches or pocket lamps. Vidor Ltd., West St., Erith, Kent.

Mem. 669,914. Class 9. Switches, contacts, fuses, transformers, terminals, etc. Midland Electric Mfg. Co. Ltd., M.E.M. Works, Reddings Lane, Tyseley, Birmingham 11.

HENLEY *Modern*

DISTRIBUTION PILLARS AND PANELS

GROUP 24

Designed by engineers of experience

Embodied in the new HENLEY Distribution Pillars are all those features that keen distribution engineers are looking for, together with a shell of modern pleasing appearance.

Robust cast-iron construction throughout with detachable plintn and roof.

Adequate provision for ventilation.

One-piece insulating right-angle type shields acting as phase barriers and vertical front shields for busbars.

Four sizes of Units are available, 200 to 1,000 amp, suitable for 3-phase 4-wire systems with cartridge fuse-link protection up to 60 amp for fifth core, if required. Units for other systems can be supplied.

One-piece insulators with specially designed entry to facilitate insertion or removal of conductor fittings.

Conductor fittings are reversible and interchangeable. Crossing of conductor cores is avoided.

Height 3′ 11″ above ground. Depth 14½″.

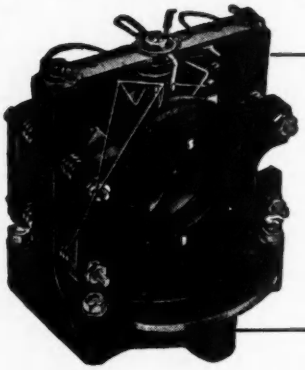
Enquiries invited. Please ask for Folder 24/A

W.T.HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON GARDEN, LONDON, E.C.1

FEATURES OF WESTON SUPERIORITY

Weston
DYNAMOMETER SUB-STANDARD INSTRUMENTS

This latest development of the well-known 'Weston' sub-standard Wattmeter is made in three models, each of high-grade dynamometer type, designed for a wide range of precision measurements. The standard series is particularly suitable for meter standardisation and for use as a transfer standard between A.C. and D.C. circuits. Type 2 is recommended for low power factor circuits and Type 3 for higher power frequencies. Similar in size and design, each is housed in a lightweight Bakelite case, with easy reading 6″ scale, knife-edge pointer and anti-parallax mirror. The moving element is fitted with spring-loaded jewels, double magnetic shielding is employed and each instrument carries a certificate of individual performance and guarantee of accuracy to 0.25%. Ample voltage and current ranges are available by simple switching which can be safely applied when the instrument is on load. Model S67 (as illustrated). Size 11″ × 9½″ × 6½″. Weight 10 lbs. (approx.)



EXTREME RIGIDITY. An unique feature of these 'Weston' models is the self-contained assembly independent of the casing, thus ensuring extreme rigidity. The whole instrument is housed as one complete unit in an attractive Bakelite case with leather carrying strap and detachable cover. Ample shielding and the absence of metal parts eliminate errors due to external magnetic fields and eddy currents.

SANGAMO WESTON LIMITED

ENFIELD, MIDDLESEX.

Telephone : Enfield 3434 (6 lines) & 1242 (4 lines) - - Telegrams : Sanwest, Enfield

BRANCHES: GLASGOW, MANCHESTER, NEWCASTLE-ON-TYNE, LEEDS, WOLVERHAMPTON, BRISTOL, SOUTHAMPTON, BRIGHTON, LIVERPOOL, NOTTINGHAM

121

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

BURGH OF KILWINNING

STREET LIGHTING

THE Town Council invite offers for the lighting of trunk road A 78 within the Burgh of Kilwinning by sodium vapour electric discharge lamps. Intending offerers may obtain conditions of tender, specification, etc., from the Burgh Surveyor, Council Chambers, Kilwinning. Closing date for offers—March 9, 1951. (H 617)

CHEADLE AND GATLEY URBAN DISTRICT COUNCIL

STREET LIGHTING STORES

THE Council invite tenders for the supply of the undermentioned materials for the year ending March 31, 1952:—

1. Electric lamps for street lighting purposes;
2. Street lighting standards and fittings.

Specifications and forms of tender may be obtained from Mr. G. P. Stanley, Engineer and Surveyor, Town Hall, Bruntwood, Cheadle, Cheshire.

Tenders, in plain envelopes, duly sealed and endorsed "Tenders—Street Lighting Stores," to be delivered to the undersigned not later than twelve o'clock noon on Wednesday, February 28, 1951.

The Council do not bind themselves to accept the lowest or any tender.

W. TIMPERLEY,
Clerk to the Council.

Town Hall, Bruntwood,
Cheadle, Cheshire.
February 6, 1951. (H 615)

COUNTY BOROUGH OF SWANSEA

44 FLATS AT NEW STREET

TENDERS FOR ELECTRICAL INSTALLATION

ELECTRICAL engineers wishing to tender for the Electrical Installation for 44 Flats at New Street are invited to submit their applications to the Borough Architect, Guildhall, Swansea, on or before February 24, 1951.

Plans, specification and conditions of contract will be forwarded on application and deposit of £2 provided applicant gives satisfactory evidence of having previously carried out work of a similar character.

The deposit will be refunded after delivery of a bona fide tender (which is not subsequently withdrawn) and the return of all documents.

No guarantee is given that the lowest or any other tender will be accepted.

T. B. BOWEN,
Town Clerk.

Guildhall, Swansea.
January 30, 1951. (H 562)

APPOINTMENTS VACANT

CANADA
ONTARIO

Large electrical company requires EXPERIENCED CIVIL, ELECTRICAL and MECHANICAL ENGINEERS, DRAUGHTSMEN and TECHNICIANS. Excellent opportunities. Call, or write, stating experience:

Dept. B., Ontario Immigration, Ontario House, Charles II St., London S.W.1. (H 419p)

BRITISH ELECTRICITY AUTHORITY

PERSONAL ASSISTANT TO THE DEPUTY CHIEF ENGINEER (RESEARCH) AT HEADQUARTERS—LONDON

APPLICATIONS are invited for the appointment of Personal Assistant to the Deputy Chief Engineer (Research) at Headquarters in London.

The salary for the appointment, which is superannuable, will be within the provisional salary range £800 to £1,150 p.a., including London allowance.

Candidates should be honours graduates in Mechanical Engineering, or be qualified for Corporate Membership of either the Institution of Mechanical, Electrical, or Civil Engineers. They should have a thorough understanding of the physical basis of engineering science generally, and of thermodynamics and modern generation practice in particular. They should, in addition, possess the faculty of clear self-expression.

Application forms may be obtained from the Secretary's Office (Establishments), Applications Section, British Electricity Authority, British Electricity House, Great Portland Street, London, W.1 and should be completed and returned to D. Moffat, Director of Establishments, not later than March 6, 1951.

Please quote Reference AE/130. (H 620)

KENT COUNTY COUNCIL

APPLICATIONS are invited for the following appointments in the Buildings Department:—

(1) SENIOR ENGINEERING ASSISTANT (Electrical) at a salary in A.P.T. Grade VI (£595-£660).

(2) ENGINEERING ASSISTANT (Electrical) at a salary in A.P.T. Grade V (£520-£570).

Candidates must be capable draughtsmen with at least five years' experience in the preparation of schemes, specifications and estimates for all classes of electrical installation work. The duties will include the preparation of drawings, inspection of premises and supervision of installations.

Applicants for (1) must be Corporate Members, and for (2) Graduate Members, of the Institution of Electrical Engineers.

The posts are superannuable and the successful candidates will be required to undergo a medical examination.

Applications, on forms obtainable from the County Architect, Springfield, Maidstone, must be delivered to him within fourteen days of the appearance of this advertisement.

W. L. PLATTS,
Clerk of the County Council.

County Hall, Maidstone.
January 30, 1951. (H 574)

CROWN AGENTS FOR THE COLONIES

ELECTRICAL FOREMAN required by the Somaliland Government Public Works Department for two tours, each of 12 to 15 months in the first instance. Commencing salary according to age and experience in salary scale £560 rising to £700 a year. Outfit allowance £30. Free passages. Liberal leave on full salary. Candidates under 40 years of age, must have served an electrical engineering apprenticeship and have had good experience in their trade, covering work on HV and LV transmission and distribution equipment, on house wiring, wiring for motors and other equipment, and the repair and overhaul of alternators, motors, etc.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M.28428 B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (H 647)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of THIRD ASSISTANT ENGINEER (DOMESTIC APPLIANCE REPAIRS) at the Llanarth Street Depot, Newport, in the Eastern Sub-Area of the Board.

The successful applicant will be required to organise and supervise the work of the Sub-Area Domestic Appliance Repair Department, and should have had experience in modern workshop practice, preferably in the reconditioning and testing of all types of domestic electrical appliances, and a knowledge of office and stores procedure.

The salary for the position will be in accordance with Class "H," Grade 10 (£571/£584/£597) of the National Joint Board Schedule for the Electricity Supply Industry.

Applications, stating age, present salary, practical and technical qualifications and experience, and whether married or single, together with the name and addresses of three referees, should be addressed to the Secretary (Establishments), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him, not later than February 24, 1951.

D. G. DODDS,
Secretary.
(H 670)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT ENGINEER in District 225 (Ammanford) in the West Central Sub-Area of the Board.

Applicants should have experience in the construction, operation and maintenance of substations and underground and overhead high and low voltage mains in urban and rural areas.

Preference will be given to applicants who possess an engineering degree of a British University, the Higher National Certificate or its equivalent or have passed the graduateship examination of the Institution of Electrical Engineers.

The salary for the position will be in accordance with Class "D," Grade 7 (£563/£568/£573) of the National Joint Board Schedule for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than February 24, 1951.

D. G. DODDS,
Secretary.
(H 672)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ENGINEERING DRAUGHTSMAN (Electrical) in the Chief Engineer's Department, Head Office, St. Mellons.

Candidates should have had a regular Electrical Engineering Training with experience in a Manufacturer's Works and should be familiar with the preparation of finished drawings for Switchgear and Substation layouts and with the layout of Protection Schemes.

Preference will be given to candidates holding either a degree of a British University or the Higher National Certificate in Electrical Engineering or equivalent qualifications.

The provisional salary will be £450 per annum pending the determination of the final grading by the appropriate negotiating machinery.

Applications, stating age, whether married or single, present position, present salary, full details of education, training, experience (technical qualifications), together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than February 24, 1951.

D. G. DODDS,
Secretary.
(H 671)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of GENERAL FOREMAN in the Engineering Department at Milford Haven in the Western Sub-Area of the Board.

Applicants must have had a general experience in overhead and underground HV/LV construction, the operation and maintenance of H.V and L.V networks, and the installation of services, etc.

The wages will be in accordance with the National Joint Industrial Council Agreement for the Electricity Supply Industry, the rate at present being 3s. 4½d. per hour.

Although it is not a condition of the appointment, it is anticipated that arrangements can be made for the successful applicant to take over the tenancy of a house in the area.

Applications, stating age and giving full details of experience should be addressed to the Sub-Area Manager, The South Wales Electricity Board, South Beach Pavilion, Tenby, so as to reach him not later than February 24, 1951.

D. G. DODDS,
Secretary.
(H 660)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of GENERAL ASSISTANT ENGINEER in the Electrical Engineering section of the Chief Generation Engineer's (Construction) Department at Wolverhampton. The salary range will be in accordance with Schedule "C" of the National Joint Board Agreement, Grade 8, £437 to £569 per annum.

Applicants should possess Higher National Certificate in electrical engineering or an equivalent qualification. Preference will be given to candidates who have followed a recognised course of training at an electrical manufacturer's works and have had experience of electrical equipment in power stations.

Conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Establishment Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than March 3, 1951.

F. W. LAWTON,
Divisional Controller.
(H 661)

CROWN AGENTS FOR THE COLONIES

ELECTRICAL ENGINEER (MECHANICAL) required by the Central Electricity Board, Federation of Malaya for 3 years with prospects of permanency. Salary (including expatriation pay) payable in local currency, equivalent at the present Government rate of exchange to £742 a year rising to £1,652 a year. Commencing salary according to age and experience. Cost of living allowance equivalent to between £210 and £525 a year according to salary and dependants. Free passages. Liberal leave on full salary. Candidates between 24 and 35 years of age must have had a good general education and be corporate members or graduates of the Institution of Electrical or Mechanical Engineers or possess equivalent qualifications and have had sound training in both electrical and mechanical engineering with experience in the operation and maintenance of diesel-alternator generating plant of up to 1,000 kW units. Experience in an electricity supply undertaking would be a distinct advantage.—Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M.28370 B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.
(H 646)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of ASSISTANT MAINTENANCE ENGINEER (Mechanical) at Nechells "B" Generating Station, Class "J," Grade 9, commencing salary £643 per annum.

Applicants should have had sound technical training and should be well experienced in power station mechanical maintenance. The possession of Higher National Certificate in mechanical engineering or an equivalent qualification will be considered an advantage.

Salary and conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned, not later than March 3, 1951.

F. W. LAWTON,
Divisional Controller.
(H 663)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for a vacancy in each of the following sections of the Technical Engineer's Department for a GENERAL ASSISTANT ENGINEER.

(a) Protective Gear.
(b) System Development.

The terms and conditions of employment will be those approved by the National Joint Board, and the salary will be in accordance with Grade 8 of the Schedule, namely, £437 to £586 per annum.

Candidates should have had appropriate experience of technical work in either or both of the sections mentioned.

Candidates should either possess technical qualifications and experience admitting to corporate membership of the Institution of Electrical Engineers or equivalent, or be studying for the examinations of the Institution.

Forms of application may be obtained from the undersigned and must be returned by March 2, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth.
(H 676)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of GENERAL ASSISTANT in the Commercial Department of the Central Sub-Area of the Board based on Cardiff.

Applicants must have had an engineering training and experience in the development of electricity supply generally. Preference will be given to applicants who possess the Higher National Certificate in Electrical Engineering or its equivalent.

The salary for the position will be in accordance with Class "K," Grade 13 (£515 to £526 to £537) of the National Joint Board Schedule for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than February 24, 1951.

D. G. DODDS,
Secretary.
(H 667)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT in the Commercial Department of District 464 in the Eastern Sub-Area of the Board based on Abergavenny.

Candidates must have had an engineering training. Preference will be given to those who possess the Higher National Certificate in Electrical Engineering or its equivalent. The successful applicant will be required to assist generally the District Commercial Manager.

The salary for the position will be in accordance with Class "A," Grade 7 (£430/£451/£472) of the National Joint Board Agreement for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than February 24, 1951.

D. G. DODDS,
Secretary.
(H 669)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of BOILERHOUSE SHIFT CHARGE ENGINEER at Earley Generating Station.

Applicants must have had a sound technical training and be experienced in all branches of engineering associated with the operation of pulverised fuel fired h.p. boiler plant, and have considerable knowledge of combustion and boiler chemistry. Graduate membership of the Institution of Mechanical or Electrical Engineers will be a strong recommendation.

The salary will be in accordance with Grade 9, Class "G," of the National Joint Board Schedule, at present £571 to £597 per annum.

Application forms may be obtained from the undersigned and should be returned not later than March 2, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth. (H 677)

BRITISH ELECTRICITY AUTHORITY

Glasgow Regional Office

THIRD ASSISTANT ENGINEER (ELECTRICAL)—PRODUCTION, INSPECTION AND TEST SECTION

APPLICATIONS are invited for the position of Third Assistant Engineer in the Production, Inspection and Test Section of the Generation Construction Branch of the Chief Engineer's Department at the Regional Office in Glasgow.

Applicants should have educational and engineering qualifications up to the standard required for Graduate Membership of the I.E.E. or I.Mech.E. Recent first-hand experience of production methods, test and inspection work in manufacturers' works in connection with electrical plant and equipment for modern power stations is essential, and some experience of actual constructional and plant erection work at power stations and attendance at site progress meetings, etc. would be an advantage.

The salary for the appointment, which is superannuable, will be in accordance with Grade 4 of the N.J.B. Agreement, £644 to £769 per annum, rising to a maximum of £849 per annum.

Applications, stating age, present salary and giving full details of qualifications and experience, should be forwarded to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, to be received not later than March 5, 1951.

Please quote Reference AE/133. (H 621)

BRITISH ELECTRICITY AUTHORITY

North-Western Division

APPLICATIONS are invited for the following positions, all of which are superannuable:—

No. 366. POWER STATION SUPERINTENDENT, Greenhill, Oldham.

The salary will be £935/£977, Grade 1, Class "E," of the revised N.J.B. Agreement. Applicants should be fully qualified Engineers with practical experience in the administration, operation and maintenance of a steam generating station.

No. 367. ASSISTANT SHIFT CHARGE ENGINEER, Kearsley Generating Station.

The salary will be £687/£715, Grade 9, Class "K," of the revised N.J.B. Agreement. Candidates should preferably have had experience in a large modern steam generating station, and possession of technical qualifications is desirable.

No. 369. ASSISTANT CHEMISTS (2), Manchester Area.

The commencing salary which is provisional pending negotiations with the appropriate body, will be within the range £375/£435 per annum according to experience, qualifications, and the classification of the generating station to which appointed. Candidates should preferably hold the Higher National Certificate in Chemistry and have had experience in general chemical analysis.

Applications, quoting the vacancy number and stating age, experience, qualifications and present position, should be sent to The Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than February 24, 1951. (H 634)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for two vacancies for THIRD ASSISTANT TRANSMISSION ENGINEERS.

Applicants for one position should be Corporate Members of the Institution of Electrical Engineers or equivalent qualifications and should have sound knowledge of the design and erection of high voltage transmission plant, together with experience of site testing and commissioning of substation plant and associated protective equipment. Applicants for the other position should be Corporate Members of the Institution of Electrical Engineers or equivalent qualifications and should have experience in laying, jointing and testing of underground cables up to 132 kV and have experience in the design and manufacture of cables and cable systems.

In both cases the commencing basic salary will be within the range £579 to £710 per annum, plus 5% London Allowance, in accordance with revised N.J.B. Schedule, Class "AX," Grade 5, subject to an ultimate maximum of £799 per annum, plus London Allowance, in Class "EX."

The appointments will be superannuable.

Applications, stating age, qualifications and experience, should be sent to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, not later than 7 days after the appearance of this advertisement. (H 635)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of STATION SHIFT CONTROL ENGINEER at Ironbridge Generating Station, Class "H," Grade 10, commencing salary £571 per annum.

Applicants should possess the Higher National Certificate in electrical engineering or equivalent qualification, and should have had sound technical training and practical experience in the control and operation of steam generating plant and main switchgear.

Salary and conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and be returned not later than March 10, 1951.

F. W. LAWTON,
Divisional Controller.
(H 662)

LONDON ELECTRICITY BOARD

STRUCTURAL DRAUGHTSMEN

APPLICATIONS are invited for the above positions in the Chief Engineer's Department at present located at Lesco House, Stamford Street, S.E.1.

Applicants should be designer-detailers having a knowledge of building construction and experience in the design and detailing of either reinforced concrete or structural steelwork, or both.

Pending grading of the posts under the National Agreement of the appropriate negotiating body, commencing salaries will be from £500 per annum, dependent upon qualifications and experience.

Application forms, obtainable on receipt of an addressed foolscap envelope, from Establishments Officer, 46 New Broad Street, E.C.2, to be returned within seven days of the appearance of this advertisement, quoting reference EST/V/995/T on envelope and all correspondence. (H 658)

SOUTH EASTERN ELECTRICITY BOARD

Ashford District

DISTRICT COMMERCIAL ENGINEER

SALARY £667 per annum, rising to £703 per annum under N.J.B. Schedule, Class "D," Grade 4. Superannuation will be arranged. Appropriate technical qualifications an advantage. Applicants must be experienced in the supervision and organisation of all installation work and showroom management, the preparation of estimates for domestic, commercial, and industrial installations, and be capable of developing agricultural load. The person appointed will be responsible to the District Manager for the commercial department.

Applications, giving two referees, must reach R. Mellor, Esq., M.I.E.E., Ashford Manager, South Eastern Electricity Board, Electricity Works, Victoria Road, Ashford, Kent, by February 26, 1951.

Central Sussex District

FIRST ASSISTANT DISTRICT ENGINEER

Salary of £662 per annum, rising to £694 per annum under the N.J.B. Schedule, Class "E," Grade 5. Superannuation will be arranged. Mainly rural district, with 740 miles of mains and over 600 sub-stations. Applicants should have suitable technical qualifications and be competent in the planning, construction, operation, and maintenance of underground and overhead distribution systems up to 11 kV. A knowledge of 33 kV practice an advantage. Accommodation will be offered to the successful candidate. Applications previously submitted will be reconsidered with those now received.

Applications, giving two referees, must reach A. M. Harker, M.A. (Cantab), Central Sussex Manager, South Eastern Electricity Board, Electra House, Church Road, Haywards Heath, Sussex, by February 26, 1951.

Mid-Sussex Sub-Area

GENERAL ARCHITECTURAL AND SURVEYING ASSISTANT

Salary of £510 by £20 to £570 under N.J.C. Agreement, Grade 4. Superannuation will be arranged. Candidates must be competent draughtsmen and have considerable experience in surveys of land and buildings, building design, and the construction and maintenance of buildings by contract and direct labour. Preference given to candidates with appropriate qualifications.

Applications, giving two referees, must reach H. Pryce-Jones, M.Eng., M.I.C.E., Mid-Sussex Manager, South Eastern Electricity Board, Electric House, Castle Square, Brighton 1, Sussex, by March 2, 1951.

A. L. BURNELL,
Secretary.

February, 1951. (H 659)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of GENERAL ASSISTANT ENGINEER in the System Operation Department at Divisional Headquarters.

The terms and conditions of service will be those approved by the National Joint Board, and the salary will be in accordance with Class "AX," Grade 8, namely, £437 to £586 per annum.

Applicants should preferably have technical qualifications admitting to corporate membership of the Institution of Electrical Engineers or its equivalent, and experience in the operation and control of interconnected power systems, or in the operation of power station plant.

Forms of application may be obtained from the undersigned and should be returned by March 2, 1951.

P. D. A. OLIVER,
Divisional Secretary,

British Electricity House,
High Street, Portsmouth. (H 675)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of ASSISTANT MAINTENANCE ENGINEER (Mechanical) at Ironbridge Generating Station, Class "H," Grade 9, commencing salary £609 per annum.

Applicants should have had sound technical training and should be well experienced in power station mechanical maintenance. The possession of Higher National Certificate in mechanical engineering or an equivalent qualification will be considered an advantage.

Salary and conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned, not later than March 3, 1951.

F. W. LAWTON,
Divisional Controller.
(H 664)

LONDON ELECTRICITY BOARD

TECHNICAL ASSISTANT, DESIGN AND PLANNING BRANCH

APPLICATIONS are invited for the above position in the Engineering Department, North Eastern Sub-Area at 84 Romford Road, E.15.

Applicants should be corporate members of the I.E.E. or equivalent, and should have had considerable experience in planning and estimating for electricity supply distribution networks.

The post has been graded under the National Joint Board Agreement of February 17, 1950, as Class "K," Grade 10—£678 6s. per annum, rising to £707 14s. per annum, inclusive of London area allowance. This grading is subject to the approval of the District Joint Board and confirmation by the National Joint Board.

Application forms, obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned duly completed within seven days. Please enclose addressed foolscap envelope and quote reference EST/V/1162/T on envelope and all correspondence. (H 666)

CITY OF MANCHESTER

Housing Committee

APPLICATIONS are invited from persons having the required qualifications and experience for the position of :—

ENGINEERING ASSISTANT in the Quantity Surveying Section.

Applicants should have had experience in the preparation of schemes for gas and electrical installations in houses and block flats, the preparation of specifications, supervision of work in progress and checking of final accounts for such work.

The salary and conditions of service will be in accordance with Grade III of the National Scheme of Service Conditions, i.e., £450 rising by £15 annually to £495 per annum.

Candidates should forward particulars of age, qualifications and experience to Mr. A. Mackenzie, L.R.I.B.A., Director of Housing, Town Hall, Manchester 2, so as to be received by February 28, 1951.

Canvassing is prohibited.

PHILIP B. DINGLE,
Town Clerk.

February, 1951. (H 680)

BRITISH ELECTRICITY AUTHORITY

Transmission Design Branch

CHIEF ENGINEER'S DEPARTMENT—LONDON

APPLICATIONS are invited for the following positions in the Transmission Design Branch at Headquarters in London: (*a*) SECOND ASSISTANT ENGINEER (Electricity Meters and Instruments), within Grade 3 of the N.J.B. Agreement, £755 to £1,017 p.a., rising to £1,120 p.a. including London Allowance; (*b*) THIRD ASSISTANT ENGINEER (Protective Gear), and (*c*) THIRD ASSISTANT ENGINEER (Overhead Lines), within Grade 4 of the N.J.B. Agreement £676 to £807 p.a., rising to £891 p.a. including London Allowance.

For position (*a*) candidates should be Corporate Members of the I.E.E. and should preferably hold a Degree in Electrical Engineering. They should have special experience in the design, application and operation of large bulk supply metering schemes and have good knowledge of the theory and practice of electrical measuring instruments of all types.

For position (*b*) candidates should have technical qualifications not less than those required for Associate Membership of the I.E.E. They should have good all-round experience in the theory and practical application of modern types of protective gear for large high voltage systems, good general knowledge of electrical plant characteristics and be accustomed to the preparation and interpretation of complex wiring diagrams.

For position (*c*) candidates should have educational qualifications not less than those required for Associate Membership of the Inst.C.E. or the I.E.E. They should have experience in the design, construction and maintenance of high voltage steel tower overhead lines. Familiarity with calculations in the detailed design of the steel towers themselves and the design of foundations in varying classes of ground would be an advantage.

The duties of all the above appointments will be to study new developments, to analyse and follow up the results of service experience and to advise on the application of new equipment and new methods to the Authority's high voltage transmission systems.

The starting salary for the appointments, which are superannuable, will be determined according to the qualifications and experience.

Application forms may be obtained from the Secretary's Office (Establishments), Applications Section, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, and should be completed and returned to D. Moffat, Director of Establishments, not later than February 26, 1951. The information on the Application Form may be supplemented on separate sheets if so desired.

Please quote Reference AE/131. (H 575)

NORTH WESTERN ELECTRICITY BOARD

No. 1 Sub-Area

APPOINTMENT OF JUNIOR ENGINEERS, CONSUMERS' ENGINEER'S DEPT.

APPLICATIONS are invited for the appointment of Junior Engineers in the Power Sales Section of the No. 1 Sub-Area Consumers' Engineer's Department, Town Hall, Manchester. Applicants should have had a sound technical education and have served a recognised apprenticeship in electrical engineering. Preference will be given to applicants who possess the Higher National Certificate in Electrical Engineering or an equivalent qualification.

The duties will include the preparation of specifications, the analysis of tariffs and assisting in the development of the utilisation of electricity. The salary will be in accordance with the National Joint Board Revised Schedule, within the range Class "M," Grades 21-17, i.e. £375-£481 per annum.

Applications, stating age, qualifications, experience, present post and salary should be received by the Sub-Area Secretary, No. 1 Sub Area, The North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, not later than Saturday, February 24, 1951.

APPOINTMENT OF DRAUGHTSMEN

Applications are invited for the appointment of Draughtsmen in the Electrical and Building Sections of the No. 1 Sub Area Drawing Office, Town Hall, Manchester.

ELECTRICAL SECTION:

Applicants should have served a suitable apprenticeship, and possession of the Ordinary National Certificate or Higher National Certificate in Electrical Engineering will be an advantage. Applicants should have had experience in the layout of sub-stations and the diagrams of connections of the associated switchgear, transformers and protective systems.

BUILDING SECTION:

Applicants should have had suitable practical experience, be able to prepare estimates and full detailed drawings of sub-station buildings, and should have had at least two years' experience of this class of work.

The salaries for these posts are provisional and subject to negotiation with the appropriate body, and will be within the range £400-£500 per annum, according to qualifications and experience.

Applications, stating age, qualifications, training and experience ,should be received by the Sub-Area Secretary No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, not later than Saturday, February 24, 1951.

APPOINTMENT OF SECOND ASSISTANT ENGINEER (BUILDING CONSTRUCTION)

Applications are invited for the appointment of Second Assistant Engineer (Building Construction) in the Construction Section of the Mains Engineer's Department at the No. 1 Sub Area Headquarters, Town Hall, Manchester.

The successful applicant will be responsible to the Section Head (Construction) for the control and operation of a sub-section composed of members of all trades in the building industry. The sub-section will carry out the repair and maintenance of all the Board's premises within the Sub-Area, and the erection of new sub-stations, office blocks, etc.

Applicants must have had a wide experience in the control of labour, supervision of contractors, estimating and costing, and must have had practical experience in building design.

The salary for the post will be in accordance with the National Joint Board Revised Schedule, Class "M," Grade 7, i.e. £900-£915-£930 per annum. The post is superannuable.

Applications, stating age, qualifications and experience, present post and salary, should be received by H. G. Bell, Esq., M.Sc.(Tech.), M.I.E.E., Sub-Area Manager, No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, not later than Saturday, February 24, 1951. (H 648)

MIDLANDS ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEER

APPLICATIONS are invited for the above position in the Dean Forest District of the Central Gloucestershire Sub-Area.

Applicants must have had experience in all branches of distribution work, including operation and maintenance of high and low voltage cables, overhead lines, sub-stations, etc.

Appropriate technical qualifications will be considered an advantage. The appointment will be in accordance with N.J.B. Conditions. Salary, Class "D," Grade 10 (£465/£473/£481), subject to negotiation.

Applications, in writing, stating age, qualifications, experience and present salary, should be forwarded (quoting Ref. T/36) to: Mr. D. Holt, Manager, Central Gloucestershire Sub-Area, Midlands Electricity Board, 126 London Road, Gloucester.

A. STEPHENS,
Secretary.

February 6, 1951. (H 674)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the following positions at the New Nechells "B" Generating Station, which will have an ultimate capacity of 210 MW :—

(a) OPERATION AND EFFICIENCY ENGINEER. The grading of this position, which is subject to confirmation by the National Joint Board, will be Class "J," Grade 5, £857 to £897 per annum.

Candidates should possess a university degree in engineering, or corporate membership of the Institution of Electrical or Mechanical Engineers. Candidates with Higher National Certificate in electrical and mechanical engineering, or who hold an equivalent qualification will be given consideration. The successful applicant will be responsible for the efficiency and operation of the generating station plant. Operation and Maintenance experience in a large generating station is essential.

(b) 5 SHIFT CHARGE ENGINEERS. Salary will be in accordance with Class "J," Grade 7, £736 to £770 per annum.

Candidates should preferably possess Higher National Certificate in electrical and mechanical engineering, and should have considerable experience in the control and operation of steam generating plant and main switchgear.

(c) 5 SHIFT CONTROL ENGINEERS. Salary will be in accordance with Class "J," Grade 10, £609 to £633 per annum.

Applicants should have sound technical training and practical experience in the control and operation of steam generating plant and main switchgear, and should possess appropriate technical qualifications.

Conditions of service will be in accordance with the N.J.B. Agreement, and superannuation will be under terms approved by the British Electricity Authority.

Forms of application may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than March 3, 1951.

F. W. LAWTON,
Divisional Controller.
(H 665)

EASTERN ELECTRICITY BOARD

Suffolk Sub-Area

ASSISTANT COMMERCIAL ENGINEER, STOWMARKET

APPLICATIONS are invited for the above appointment.

Candidates should preferably be corporate members of the Institution of Electrical Engineers and should have had a sound engineering training and a wide experience of industrial installations and of the application and utilisation of electricity for commercial and industrial purposes. The successful candidate will be required to negotiate tariffs and conditions for supplies of electricity for industrial purposes, to give specialist advice on utilisation and to assist in the co-ordination of development of power sales generally.

The annual provisional salary for the appointment will be £675.

Applications, stating age, education, qualifications and experience, together with details of present employment, should be addressed to: The Manager, Suffolk Sub-Area, Eastern Electricity Board, Finborough Hall, Stowmarket, Suffolk.

The future salary and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidate will be required to contribute to a superannuation scheme, and may be required to undergo a medical examination.

Applications should be addressed to the person concerned so as to arrive within fourteen days of the appearance of this advertisement. (H 678)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT in the Commercial Department of District 350 in the Central Sub-Area of the Board, based on Cowbridge.

Candidates must have had an engineering training. Preference will be given to those who possess the Higher National Certificate in Electrical Engineering or its equivalent. The successful applicant will be required to assist generally the District Commercial Manager.

The salary for the position will be in accordance with Class "E," Grade 11 (£459/£467/£475) of the National Joint Board Agreement for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than February 24, 1951.

D. G. DODDS,
Secretary.
(H 668)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

Bracknell District of No. 1 (Southall) Sub-Area

ASSISTANT ENGINEER (OPERATION AND MAINTENANCE)

Salary N.J.B., Class "E," Grade 8, Column 1 (£550 per annum). N.J.B. conditions of service.

Duties will include the operation and maintenance of switchgear, transformers and cables up to and including 33kV.

Applications on forms obtainable from Sub-Area Secretary, 2-6 Windmill Lane, Southall, Middlesex, and returned to him not later than 14 days after the appearance of this notice.

Isle of Wight District of No. 3 (Portsmouth) Sub-Area

ASSISTANT ENGINEER (MAINS)

Provisional salary £450 per annum, subject to adjustment. Conditions of service as prescribed from time to time.

Candidates should have had experience in designing, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution systems and substation plant and should possess suitable technical qualifications.

Applications on forms obtainable from Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him not later than 14 days after the appearance of this notice

Based at Aldershot and Portsmouth (No. 3 Sub-Area)

FOREMEN LINESMEN AND LINESMEN (OVERHEAD POWER)

Wages and conditions of service in accordance with N.J.I.C. Agreement.

Applicants must have had experience in the erection of h.v. and l.v. overhead transmission and distribution lines, having wood-pole supports.

Applications in writing, stating the district preferred to Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, not later than 14 days after the appearance of this notice.

The successful candidates for the first and second of the above appointments will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

F. W. KEMPTON,
Secretary.
(H 679)

A LEADING Cinema Group with head office in London requires a qualified ENGINEER. Experience of the cinema industry not essential but knowledge should embrace the types of electrical and mechanical equipment employed in cinemas. Applicants for this post must have had a first-class education and technical training and should preferably be under 40 years of age.—Write, stating age, qualifications, experience and salary required, to Managing Director, Box No. 3067, Electrical Times. (H 628)

A SMALL engineering firm in Harrow require the services of a competent DRAUGHTSMAN for electrical and mechanical detail work.—Box No. 3073, Electrical Times. (H 637)

ASSISTANT ENGINEER required by large engineering organisation in East London area for capacitor design and development. Age, 21-25 years. Good opportunities for advancement. Degree or Higher National Certificate. —Electrical.—Write, stating age and qualifications, to Box No. 3065, Electrical Times. (H 614)

ELECTRICAL/MECHANICAL INSPECTOR

An Electrical/Mechanical Inspector is required by a major British Oil Company for service in the Middle East. Applicants must have wide experience covering maintenance and inspection of installed plant associated with modern large generating stations with voltage range of 33 kV to 440 volts. Knowledge of flameproof switchgear an advantage. Possession of H.N.C. essential and qualifications up to A.M.I.E.E. desirable. Age limit 37 years. Attractive salary plus generous allowance in local currency designed to assist substantially in meeting cost of living, free passages, kit allowance, free medical attention, good leave arrangement, pension scheme.

Write, giving personal particulars, and details of qualifications and experience, quoting Dept. F.7, to Box 3291 at 191 Gresham House, London, E.C.2. (H 270p)

CABLE TECHNOLOGIST, with wide experience, is required for an important position by The Greengate and Irwell Rubber Co. Ltd., Greengate Works, Manchester 3.—Please reply in strict confidence, giving full details re experience, age, salary required. (H 631)

DRAUGHTSMEN. Britain's leading design consultants and contractors require urgently Senior Switchgear Draughtsmen, also Juniors to train as Switchgear Draughtsmen. Good salaries and prospects of advancement for suitable applicants. Pension scheme.—Write in confidence, quoting reference E.T., to John A. Smith Ltd., 24 Lichfield Street, Wolverhampton. (H 335)

DRAUGHTSMEN with experience of switchgear and or rectifier design required by Hackbridge and Hewittic Electric Co. Ltd., Walton-on-Thames. Pension scheme. Five-day week.—Write, giving past experience, technical education and salary required, to Chief Mechanical Engineer. (H 482)

DRAUGHTSMEN with experience on all sizes of power transformers required by company in S.W. London. Pension scheme in operation and five-day week. State full details, past experience, technical education and salary required.—Box No. 3019, Electrical Times. (H 480)

ELECTRICIANS with good contracting experience, used to Pyrotenax and armoured cable installations, for work at Port Talbot, South Wales.—Write or apply, stating experience, to W. J. Furse & Co. (Manchester) Ltd., 20 Mount Street, Manchester 2. (H 494)

ELECTRICAL DRAUGHTSMAN with technical qualifications and practical experience required for large paper mills in north west. Capable of preparing diagrams of new and existing installations and conversant with automatic control. Pension scheme available and good prospects of advancement.—Write, giving full particulars of previous experience to Box No. 3069, Electrical Times. (H 329

ELECTRICAL ENGINEER required for important Sugar Plant in Peru. Attractive salary and conditions, good prospects for right man under 30, preferably unmarried, including free accommodation, free transportation and home leave every three years.—Write full details to Box H.697, c/o Jackson's, 16 Gracechurch Street, London E.C.3. (H 627)

ELECTRICAL ENGINEER required as laboratory assistant. Experience must cover design and testing of watt-hour meters, together with experience in small mechanical and electrical devices. Minimum qualification, Higher National or equivalent. South West London area.—Write in first instance giving full particulars and salary required, Box No. 3083, Electrical Times. (H 682)

ELECTRICAL FITTERS (SWITCHGEAR) required in the Ludlow and Leominster Districts. Experience in the installation and maintenance of 66 and 11 kV oil circuit-breakers, and low voltage switchgear. Wages at present 36.5d. per hour; N.J.I.C. conditions.—Apply in writing, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury. (H 673

ENGINEERING ASSISTANT (ELECTRICAL) wanted to assist supervising engineering at collieries, general workshops, power plant, etc., in Assam, assistant experienced in maintenance, erection and planning of electrical installations, general mechanical engineering knowledge desirable. First emoluments approximately £1,000 per annum, provident fund, free house, passages, leave, etc.—Write, with full particulars, to The Assam Railways and Trading Co. Ltd., 154-156 Fenchurch Street, London E.C.3 (H 642)

METER TESTER required, able to take charge of repairs and testing all types of meters.—Apply in writing, giving age, experience and wages: Electric Meter Co., Castor Road, Brixham. (H 552)

REPRESENTATIVE

WOOLLEYS OF TAMWORTH invite applications for the position of Representative (covering Service and Sales) in each of the following Electricity Board areas: (1) East Midlands, (2) Yorkshire, (3) North Eastern.

ESSENTIALS.—(a) Age 25-40; (b) knowledge of Woolley equipment; (c) knowledge of at least one make of milking machine; (d) enthusiasm to give service whenever necessary; (e) proved ability to sell farm equipment; (f) tactful, pleasing manner.

DESIRABLES.—(a) Knowledge of Electric Supply Authorities in the Area; (b) knowledge of Agricultural Engineering Firms in the area; (c) organising ability; (d) ability to produce a motor-car.

IN ADDITION.—Please include details of education, War Service, positions held since leaving school, reference to any pension rights in present position, whether married, and salary required. All replies, which will be treated in strict confidence, should be addressed to **J. W. Woolley, Esq., Ashby Road, Tamworth, Staffs,** and marked (1), (2) or (3) respectively in the top left-hand corner of the envelope. Testimonials are not required in the first instance. Closing date for applications is February 28, 1951.

(H 619p)

SWITCHGEAR

JOHNSON AND PHILLIPS LIMITED require TWO SENIOR DRAUGHTSMEN. Applicants must be suitably qualified and competent to handle switchgear for indoor and outdoor main stations and substations up to 33,000 V, or to design switchgear apparatus embracing air-break and oil-break circuit-breakers. Both positions offer good scope to the right man with prospects of early promotion. Applications in writing, stating age, experience and salary required, to: **Employment and Welfare Manager, JOHNSON & PHILLIPS LTD., CHARLTON, LONDON S.E.7** (H 618p)

ENGLISH ELECTRIC require experienced DESIGN ENGINEERS for interesting heavy electrical switchgear projects. Professional engineers with sound electrical or mechanical design experience should write, giving full details, stating preference for Stafford, Liverpool, or London areas, and quoting Ref. 249B, to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London S.W.1. (H 681)

FERRANTI LIMITED invite applications for SENIOR APPOINTMENTS of graduate engineers with industrial experience in the design of electricity meters. The posts to be filled carry senior responsibility with excellent prospects, generous salary and pension.—Application forms from the Staff Manager, Ferranti Limited, Hollinwood. Please quote Reference M.E. (H 603)

FIRST-CLASS PLANNING AND METHODS ENGINEER required to apply most modern assembly methods to manufacture of small electro-mechanical products. West London area.—Write, giving age, experience, recent references and salary required, to Box No. 3071, Electrical Times. (H 636)

LARGE firm of Cable Manufacturers require a DRAUGHTSMAN with experience of cable route plans and overhead line profiles. Age 20-25. Salary £275-£375 per annum according to experience. 5-day week: Pension Fund.—Applicants should write, giving full particulars, to Box No. 3075, Electrical Times. (H 638)

OIL Refinery Contractors require a qualified ENGINEER to be responsible for specifying and selecting all types of pumps, motors, turbines, compressors, etc., used in the refining industry. Applicants should have had past experience of such equipment, particularly application of process type centrifugal pumps in the petroleum industry.—Write fully, Foster Wheeler Ltd., 3 Ixworth Place, London S.W.3. (H 399)

PHYSICAL CHEMIST or Battery Chemist required by well known electrical manufacturers, South West London area. There is considerable scope for development and advancement in the project concerned and applicants should be Associates of the Institute of Chemistry, preferably with 4-5 years' practical experience. Maximum commencing salary £600 p.a. Fares will be re-imbursed to applicants selected for interview, and all applications will be acknowledged.—Box No. 3085, Electrical Times. (H 683)

QUALIFIED ELECTRICAL ENGINEER, commercial experience essential, required for responsible permanent position Pakistan. Salary approximately £1,200 p.a. and appropriate expenses. Single man aged 30 to 35 preferred. Applicants must have sound knowledge theory and practice of power, transmission and distribution. Knowledge of line communication system an advantage. The post offers good prospects with old established company.—Apply Box No. 2061, Electrical Times. (H 366)

SALES ENGINEER to specialise in contactor switch and control gear in London and Southern England. Electrical training essential. Age preferably not over 30.—Box No. 3081, Electrical Times. (H 649)

SALES ENGINEER required to operate in area covered by southern counties. Preference given to registered lighting engineer (I.E.S.) or corporate member, I.E.S.—Write, in confidence, giving details of education, experience, past and present employment, and remuneration required, to the Southern Area Manager, The Benjamin Electric Ltd., Brantwood Road, Tottenham, London N.17. (H 684)

SENIOR DRAUGHTSMAN required for work on Power Transformers ranging from 100 kVA up to 3,000 kVA., 66,000 V. Ordinary National Certificate in Electrical Engineering preferred. Salary according to age and qualifications.—Apply to Personnel Officer, Foster Transformer and Switchgear Ltd., South Wimbledon, S.W.19. (H 624)

SENIOR ELECTRICAL DESIGN ENGINEER required for fractional h.p. motors. B.Sc. degree or equivalent. Position permanent and progressive. Salary according to qualifications.—Apply by letter, quoting "Fan," giving full details of salary, age and experience, to Staff Manager, General Electric Co., Ltd., Witton, Birmingham 6. (H 656)

SENIOR OR INTERMEDIATE DRAUGHTSMAN required, with sound general engineering experience. Ordinary National Certificate desirable. Five-day week. Staff canteen.—Apply: Electric Furnace Co., Ltd., 161 Queens Road, Weybridge. (H 504)

THE COLNE VALLEY WATER COMPANY. Applications are invited for the appointment of ASSISTANT ELECTRICAL ENGINEER. Applicants should have a sound electrical and mechanical training and experience in the preparation of working drawings, specifications and estimates as applied to waterworks practice. They should preferably hold a degree in electrical engineering or be Chartered Electrical Engineers and should be not less than 30 years of age. The appointment is to the permanent staff and the commencing salary will be from £636 10s. to £784 per annum according to qualifications. If required, a house will be made available at a rent to be agreed. The successful applicant will be required to join the company's contributory pensions fund, the details of which, together with forms of application for the appointment, can be obtained from E. Caspall Green, M.I.C.E. Chief Engineer, The Colne Valley Water Company, Aldenham Road, Watford, Herts. (H 613)

THE GENERAL ELECTRIC CO., LTD., has a vacancy for a JUNIOR DRAUGHTSMAN in the Fittings Department at their head office. Applicants should be between the age of 25-30 years and will be required to work on design of industrial and special lighting fittings and should have had some workshop experience. Good commencing salary and prospects. The position is pensionable and sick benefits are available.—Apply in writing, giving full particulars and qualifications and previous experience, to the Staff Manager, G.E.C., Magnet House, Kingsway, W.C.2. (H 653)

THE GENERAL ELECTRIC COMPANY, LTD., invites applications for the position of MANAGER of the Electrical Department of their agency in Venezuela. Applicants may be between 28-45 years of age. A good background of technical knowledge is required, coupled with sales experience of consumer electrical apparatus such as domestic appliances, lighting fittings, radio, etc. A knowledge of Spanish is desirable. This appointment carries an attractive starting salary and there are excellent opportunities for advancement.—Apply: Staff Manager, G.E.C., Magnet House, Kingsway, W.C.2. (H 654)

TRANSFORMER DRAUGHTSMEN required by Hackbridge and Hewittic Electric Co. Ltd., Walton-on-Thames, Surrey, one having experience of transformers up to 2,000 kVA, and one having experience up to 100,000 kVA. Pension scheme. Five-day week.—Write, giving age, experience and salary required to Chief Mechanical Engineer. (H 481)

WORKS MANAGER required to take complete charge of the manufacturing side of two factories, one for Paper Insulated Cables and the other for Rubber Insulated Cables. This is an important post and only men with highest qualifications need apply.—Box No. 3049, Electrical Times. (H 567)

APPOINTMENTS WANTED

OUTSIDE SERVICE ENGINEER (39), owner-driver, lifetime experience plant, machinery, equipment, 2 year tech., 2 Govt. certs., A.I.P.R.E. Willing cover Home Counties or near. Specialist training welcomed.—90 Bensham Manor Road, North Croydon. Telephone: THO 2301. (H 466)

TWO FULLY QUALIFIED ELECTRICIANS with experience in all types of installation work in power stations, large factories and commercial establishments, at home and abroad, require progressive positions, preferably overseas.—Box No. 3017, Electrical Times. (H 479)

YOUNG MAN of culture and initiative, with wide experience of electronics and light electrical engineering, accustomed to accepting responsibility, seeks new position wherein the more uncommon traits are desired.—Box No. 3063, Electrical Times. (H 608)

WORK WANTED

S. C. H. Co.

4b STANLEY ROAD, SOUTHEND-ON-SEA

Having the organisation to produce Trade work from Blue prints to mass production competitively, are prepared to supply to Electricians for demonstration purposes

WARM o' COOL UNIT HEATERS

Particulars on request (H 540p)

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines). Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE SERVICE CO. LTD., Haddington Street, Hove (Tel. 32996), electrical engineers and winding specialists. Distance no object. (F 739)

ASSEMBLY of electrical equipment and components undertaken, in small or large quantities, at reasonable cost. Speciality, experimental apparatus made up to your requirements.—Southern Electric Motors, 49 Church Street, Twickenham. (H 657)

CASTINGS, Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (H 268)

SILVER or soft soldering, light welding, capacity available for repetition work.—Write, M.B. Co., Ltd., 68a East Hill, Dartford, Kent (Phone 3165). (H 641)

WANTED

A.C./D.C. MOTORS, STARTERS, complete changeover installation, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

NICKEL CHROME WIRE wanted: sizes 0·0166, 0·018, 0·020 and 0·022 80/20 grade; sizes 0·032 to 0·051 65/15 grade.—Box No. 3077, Electrical Times. (H 639)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write Elton Levy Co., Ltd., St. Ermin's (West Side), Caxton Street, London S.W.1. Phone: WHitehall 9621/2/3. (A 3)

STEEL, ALUMINIUM, BRASS and other non-ferrous sheets, strip, bars, off-cuts. Any quantity, gauge, size. Immediate payment.—Grades Sheared Metal Co., Ltd., Green Lane, Hounslow, Middlesex. Telephone: Feltham 3274. (H 650)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED.—Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, D.C. and A.C. ball-bearing MOTORS. MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

WANTED—SWITCHBOARDS for 9 kVA Meadows B.T.H. 230 V alternator sets.—Offers to Box No. 3041, Electrical Times. (H 547)

WANTED, two 100/150 kVA TRANSFORMERS, 400V., S.P., 50 cycles input. Low voltage high amperes output.—Kiveton Park Steel & Wire Works Ltd., Kiveton Park, near Sheffield. (H 630)

400, 500, 800 cycle ALTERNATORS or MOTOR GENERATORS wanted. All ratings and voltages. Quantities required.—Wilflo Products, 216/228 Gorbals Street, Glasgow C.5. (H 564)

AGENCIES

LONG-ESTABLISHED New Zealand merchants require exclusive Agency Rights, Electric Hand Tools, Switch and Fuse Gear and H.R.C. Fuses. Apply in confidence.—Box No. 3079, Electrical Times. (H 640)

FOR SALE

CABLES & WIRE

ALL types T.R.S. and V.I.R. CABLE in stock. Buy now while obtainable. Send for price lists.—Northern Industries, Snow Hill, Manchester 4. (D 50)

TINNED STEEL ARMATURE BINDING WIRE. All sizes from 14 s.w.g. to 30 s.w.g. supplied in coil or on reels.—Frederick Smith and Co., Wire Manufacturers Ltd., Caledonia Works, Halifax. (G 381)

DOMESTIC APPLIANCES

IMMERSION HEATERS. Grubb 4 kW. No purchase tax. All lengths, 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed and immediate delivery. Write for illustrated brochure, latest lists and trade terms to distributors.—John Owner and Co., Ltd., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

4 KW IMMERSION HEATERS 26 in. long with thermostat £6 10s. each. 15 amp. shutter type PLUGS and SOCKETS 5/- each. GALV. CHAIN for all purposes 4/6 doz. yd. 15 amp. industrial SWITCH SOCKET and PLUG 10/6 each. Metal clad SPLITTERS two-way 7/6 each. 8 mfd. dub. ballast CONDENSERS 8/6 each. Transtar Quick Start Control Units, 40W, 37/6, 80W 52/6. 3 Light Electric Fittings with Shades, fits into existing lampholder (including Pur. Tax) 38/6. Orders over £10 carr. paid.—Winco Industries, 17 Stretford Road, Manchester 15. (H 632)

ENGINEERING PLANT & MATERIALS

SIX BARRELS of Pinchin and Johnson's BLACK BAKING VARNISH to B.S.S. 514.—Applications to Purchasing Department, Messrs. Mawdsley's Ltd., Dursley, Glos. (H 622)

WELDING PLANT. Several Motor Generator Arc Welders, single, double and multi operator up to 600 amps. Input 400/440 V, 3-phase, 50 c/s. Also several single and double operator transformer arc welders. All modern units by well-known makers. Attractive prices. Full details.—Write: Thos. W. Ward, Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). (H 294)

WILD BARFIELD Electric Muffle FURNACE, complete with control panel and pyrometer, 230V/1/50c. Smithy Bellows, 2 pairs Alldays, 30in. 4in. Bench Shears. —Offers to: Gordon Russell Limited, Broadway, Worcs. (H 612)

GENERATING PLANT

DIESEL ALTERNATOR SETS from stock: 400/440 V, 3-phase, 50 c/s, 167 kVA "Waukesha/G.E.C.," 1,000 r.p.m.; 150 kVA "Petter/Brush," 500 r.p.m.; 135 kVA "Blackstone/Metro-Vick," 500 r.p.m.; 150 kW "General Motors/Westinghouse," 1,000 r.p.m.; 100 kVA "Deutz," 1,000 r.p.m.; 69 kVA "McLaren/Brush," 1,000 r.p.m.; 65 kVA "Meadows/McFarlane," 1,500 r.p.m.; 62.5 kVA "McLaren/Bruce-Peebles," 1,000 r.p.m.; 50 kVA "National/Bruce-Peebles," 750 r.p.m.; 20 kVA "Lister/Metro-Vick," 1,000 r.p.m. Full details with price post free on request. —Thos. W. Ward, Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). (H 292)

GENERATOR for sale, 220 V, d.c., 130 amps with control panel. Driven by "Tangye" 34 b.h.p. single-cylinder horizontal diesel engine. Inspection at works in W. England.—F. J. Edwards Ltd., 359 Euston Road, London N.W.1. (H 623)

STEAM DRIVEN GENERATING SETS.

7,500-kW turbo alternator by BRITISH THOMSON-HOUSTON, of the impulse type with a 2-stage Curtis wheel and 7 impulse stages, fitted with stainless steel and bronze blading and designed for use with steam at 180/200 lb. sq. in., 550/574 deg. F temperature exhausting to a vacuum of 28 in., speed 3,000 r.p.m. and direct coupled on combined baseplate to 9,400-kVA alternator; 0·8 power factor, 6,300/6,600/3/50 with exciter. The surface condenser by W. H. Allen has cooling surface of 15,500 sq. ft. and is fitted with special brass tubes. Motor driven Circulating Pump and Condensate Pump are fitted together with 2-stage steam jet air ejection. Auxiliary electric supply is 400/440/3/50.

2,500-kW (3,125-kVA) pass-out turbo-alternator set by HOWDEN/SIEMENS for 480/3/50, speed 3,000 r.p.m. Steam pressure 195 lb sq in., temperature 510° F, passing out 50,000 lb. steam per hr at 40 lb pressure. Mirrlees surface condenser and condenser pump.

Two 600-kW (750-kVA) geared turbo-alternator sets by G. and J. WEIR E.C.C. for 400/440/3/50, 4-wire, speed 4,000/1,000 r.p.m. through David Brown reduction gear. Steam pressure 150 lb sq in., 15 lb back pressure, suitable for pressures up to 190 lb sq in. With switchboard and direct coupled exciter.—George Cohen Sons and Co., Ltd., Wood Lane, London W.12 (Tel.: Shepherds Bush 2070), and Stanningley, near Leeds (Tel.: Pudsey 2241). (H 643)

1¼ kVA ALTERNATOR, 230/1.50, by Greenwood and Batley, driven by J.A.P. engine, with control box. Useful for emergency plant. Offers to: G. M. Engineers, Honiton, Devon. (H 655)

138 kVA DIESEL SETS, two available, each having Paxman engines with control panels and switchboards consisting of 500 amp and four 200 amp O.I switches. Can be synchronised. Complete with compressor starting plant. £1,700 both machines and switchboard. In excellent condition.—Boyce, Weir and Co., 778 New Hey Road, Huddersfield. Tel.: Stainland 2120. (H 609)

LIGHTING EQUIPMENT

PURLEY CHOKES AND BALLASTS. Our 80-w. Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57/6 each, subject.—F. W. Blanshard, Ltd. (Dept. ET), Purley, Surrey. Uplands 4618/9. (E 343)

METERS

A.C./D.C. SLOTMETERS (prepayment meters), all types and sizes. We supply Electricity Boards and Govt. Depts. Billiard Switches and Time Switches from stock. If you need reliable instruments write to: Brent Electrical Co., 6 Holmdale Gardens, Hendon, London N.W.4. (A 15

A.C. and d.c. quarterly and prepayment METERS.—Electric Meter Co., Castor Road, Brixham. (H 554)

HOUSE Service METERS from 5/-. Guaranteed 2 years. —Electric Meter Co., Castor Road, Brixham. (H 555)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

METERS, a.c. and d.c., new and reconditioned, all types. Quarterly; single- and three-phase; 3- and 4-wire; 2½ to 1,000 amp; prepayment, single and double tariff; single, dual and triple coin; fixed and variable tariff; 2½ to 50 amp. M.D.I. Billiard Switches, Rent Collectors. Prices from 5/-, carriage paid. Two-year guarantee. Immediate delivery. Illustrated catalogue from The Electric Meter Co., Castor Road, Brixham, Devon. (H 553)

MOTORS & STARTERS

A.A. ELECTRICAL CO.—FOR A.C. D.C. MOTORS SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

A.C. and D.C. MOTORS GENERATORS, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7232. (A 12)

A.C. and D.C. MOTORS, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). (A 10)

A.C. and D.C. Motors, Alternators, Generators, Generating Sets, Transformers, Welders, Plating equipment, Control Gear, Switchgear, Portable Electric Tools, etc. Write for current electrical stock list, post free.—Thos. W. Ward, Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). (H 291)

BRAND NEW A.C. Motors from stock: 1/3 to 150 h.p. Slip Ring and Squirrel Cage, 400/440 V, 3-phase, 50 c/s at 750, 1,000 and 1,500 r.p.m., with or without control gear. Immediate dispatch from stock. Attractive prices. —Full details post free from Thos. W. Ward, Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). (H 293)

ELECTRIC MOTORS. We have for sale a small number of used Slip Ring and Squirrel Cage Motors surplus to our requirements, 400 V., 3-phase, 50 cycle, 1 to 5 h.p.—Dobson & Crowther Ltd., Aston Road North, Birmingham 6. (H 633)

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.
STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC
Any voltage, new, short delivery, all types of revolving electrical power.
ELECTROPOWER COMPANY LIMITED
Kingsbury Works, Kingsbury Road, London N.W.9.
Telephone: COLindale 4621/2. (D 17p)

FOR ELECTRIC MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

ONE 50 h.p., 1,450 r.p.m., fully totally enclosed B.T.H. slip-ring MOTOR with push-button interlocked control panel in large sheet steel case with ammeter. In first-class condition.—Crone and Taylor, Ltd., Sutton Oak, St. Helens. (H 625)

2 H.P. Brooks MOTOR, 230/1.50, 750 r.p.m., R1-198607, with starter. Reconditioned by makers, and with 5 in. dia. pulley.—Offers to: G. M. Engineers, Honiton, Devon. (H 652)

35-H.P. Brooks MOTOR and STARTER, as new, wound for 480/1.50. Reasonable.—Slater, Newport, I.W. (H 546)

90 H.P. totally enclosed 720 r.p.m. slip-ring MOTOR. 400/3.50. Ball bearing. Complete with starter. As new. Bargain price.—Boyce, Weir and Co., 778 New Hey Road, Huddersfield. Tel.: Stainland 2120. (H 610)

SWITCHGEAR

MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London, N.22. Tel.: Bow 7221. (C 175)

TRANSFORMERS & CONVERTORS

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Dundee Area

ONE 750 kW B.T.H. ROTARY CONVERTOR, 750 revs, 400/440 V, d.c., and associated 910 kVA B.E.T. Transformer with a primary winding suitable for a 6,300 V, 3-phase, 50 c/s supply.

One 1,000 kW La Cour A.C.E.C. MOTOR CONVERTOR, 600 r.p.m., 420 V, d.c., suitable for a 6,300 V, 3-phase, 50 c/s supply.

One 300 kW La Cour Bruce Peebles MOTOR CONVERTOR, 500 r.p.m., 6,200/6,600 V, a.c., 400/450 V, d.c.

One 100 kW British Westinghouse ROTARY CONVERTOR, 380/440 V, d.c., with associated British Westinghouse 125 kW Transformer, 6,700/253 V, 3-phase, 50 c/s.

These machines can be seen on application to the undersigned:—

P. PHILIP, M.I.MECH.E., M.I.E.E.,
Area Manager.

7 Dudhope Crescent Road,
Dundee.
February, 1951. (H 651)

FOR sale, in good working order, one 150-kW traction RECTIFIER EQUIPMENT consisting of two 75 kVA bulbs, one T.K.34 transformer complete with one d.c. panel for same; also one Whipp and Bourne auto-reclose circuit breaker, type W.X.—Inspection by appointment, and offers in writing to the Corporation Transport Manager, 10 Houndgate, Darlington. (H 644)

ONE oil-fired E.C.C. TRANSFORMER, 300 kVA, 3-phase, 50 cycles, 6,300/400 V., with tap changing switch and sealing chamber on h.t., No. 42977, supplied September, 1944. Price £350 or nearest. (H 645)

UNCLASSIFIED

TESTER for locating breaks in flexible cables, etc., made for 55/- in two hours from parts easily obtained anywhere. Checks radio and car ignition condensers. Send 3/6 for blue prints giving full details.—Peat, 60 Helmton Road, Sheffield 8. (H 685)

MISCELLANEOUS

CITY AND GUILDS (Electrical, etc.) on "No pass—No Fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 176-page handbook, FREE and post free. B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1. (D 244)

RICHARDS AND PARTNERS, associated with George Offord and Co., Auctioneers and Valuers of PLANT AND MACHINERY AND INDUSTRIAL PROPERTY, Granville House, Arundel Street, London W.C.2. Tel.: TEMple Bar 7471. (A 23)

THE proprietor of British Patent No. 499274, entitled "CARBON ELECTRODES FOR ELECTRIC ARC LAMPS," offers same for license or otherwise to ensure practical working in Great Britain.—Inquiries to Singer, Stern and Carlberg, 14 E. Jackson Boulevard, Chicago 4, Illinois, U.S.A. (H 626)

INDEX TO ADVERTISERS

A.E.W. Ltd. 64
Alton Battery Co., Ltd. ... 21
Attwater & Sons, Ltd. ... 78
Automatic Coil Winder & Electrical Equipment Co., Ltd. ... 36
Automatic Light Controlling Co., Ltd. 70

Babcock & Wilcox, Ltd. ... 1
Berry's Electric, Ltd. ... 80
Bray, George & Co., Ltd. ... 20
Britannia Batteries, Ltd. ... 35
British Insulated Callender's Cables, Ltd. 18, 33
British Thomson-Houston Co., Ltd. 77, 82
Brook Motors, Ltd. 28
Burco, Ltd. 9

Cable Makers Association ... 30
Carter & Co. (Nelson), Ltd. ... 70
Cole, E. K., Ltd. 12, 72
Columbus, Ltd. 7
Crane, Walter 78
Cressall Manufacturing Co., Ltd. 4
Crompton Parkinson, Ltd. 15, 63

Daleman, Richard, Ltd. 70
Dewrance & Co., Ltd. 27
Downes & Davies, Ltd. ... 68

East London Mica Works ... 4
Edwards, F. J., Ltd. 78
Electrical Times 78
Elexcel, Ltd. 16
English Electric Co., Ltd. 23, 67
Erskine, Heap & Co., Ltd. ... 32
Evershed & Vignoles, Ltd. ... 24

Ferguson, Pailin, Ltd. ... 17
Ferranti, Ltd. 29

General Electric Co., Ltd. 46, 48, 69
Grimmer, W. H. 76
Grubb Engineering Co., Ltd. ... 12

Hart Accumulator Co., Ltd. ... 66
Heatrae, Ltd. 19
Henley's, W. T., Telegraph Works Co., Ltd. 49
Higgs Motors, Ltd. 10
Huwood Components, Ltd. ... 76

Igranic Electric Co., Ltd. ... 42
Imperial Chemical Industries, Ltd. 38
Isenthal & Co., Ltd. 64

Johnson & Phillips, Ltd. 37, 75

Londex, Ltd. 74
London Electric Wire Co., and Smiths, Ltd. 22
Low, Duncan, Ltd. 66

Mersey Cable Works, Ltd. ... 71
Metropolitan-Vickers Electrical Co., Ltd. 45
Metway Electrical Industries, Ltd. 62

Nalder Bros. & Thompson, Ltd. 8
National Cash Register Co., Ltd. 4
National Fire Protection Co., Ltd. 76
New Day Electrical Accessories, Ltd. 72
New Era Industries (Tottenham), Ltd. 68
Newton Brothers (Derby), Ltd. 20
Nife Batteries, Ltd. 3
Nu-Swift, Ltd. 70

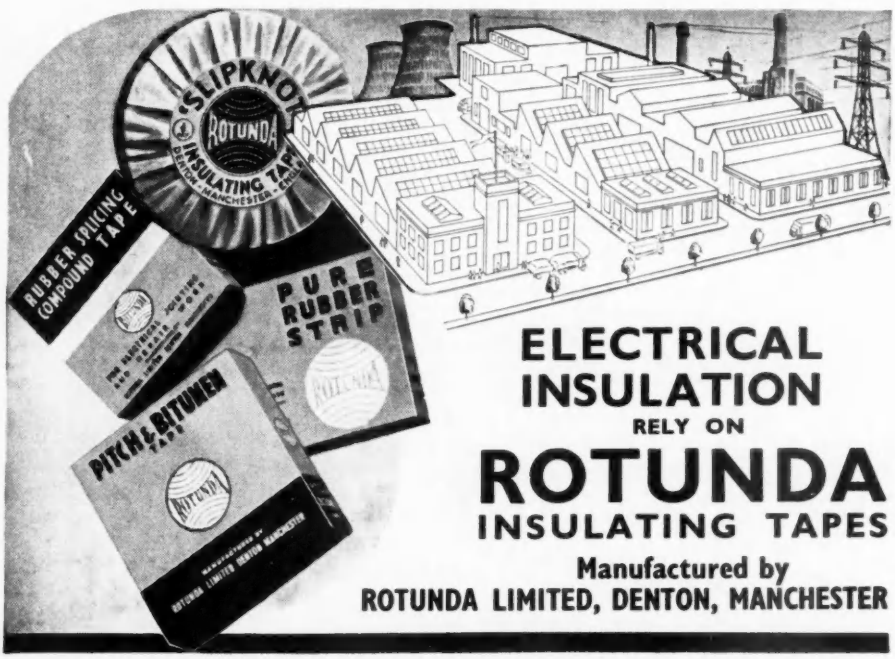
Parmiter, Hope & Sugden, Ltd. 81
Parsons, C. A., & Co., Ltd. ... 39
Partridge, Jones & John Paton, Ltd. 43
Pirelli General Cable Works, Ltd. 61
Plasticable, Ltd. 72

Renfrew Foundries, Ltd. ... 13
Reyrolle, A., & Co., Ltd. ... 79
Rotunda Ltd. 60
Rozalex, Ltd. 74
Runbaken, Ltd. 76

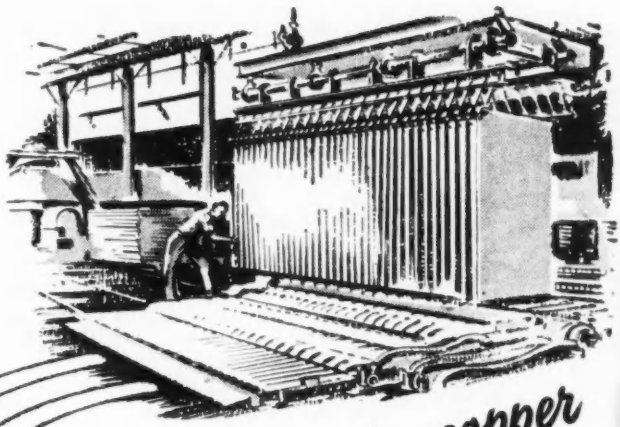
Sanders, Wm., & Co. (Wednesbury), Ltd 78
Sangamo Weston, Ltd. 50
Santon, Ltd. 14
Saxonia Electric Wire Co., Ltd. 72
Scottish Cables, Ltd. 6
Siemens Bros. & Co., Ltd. ... 65
Siemens Electric Lamps & Supplies, Ltd. 41
Simmonds & Stokes, Ltd. ... 74
Simplex Electric Co., Ltd. ... 2
Standard Telephones & Cables, Ltd. 25
Sterling Cable Co., Ltd. ... 44
Sunvic Controls, Ltd. 34

Tant, W. H., & Co., Ltd. ... 40
Thorn Electrical Industries, Ltd. 73
Thorpe, F. W., Ltd. 34
T.M.C. Harwell (Sales), Ltd. ... 31
Turnright Controls, Ltd. ... 11

Wakefield, C. C., & Co., Ltd. ... 5
Wandleside Cable Works, Ltd. ... 76
Westinghouse Brake & Signal Co., Ltd. 26
Wireohms, Ltd. 74
Wootton & Co., Ltd 62



ELECTRICAL INSULATION
RELY ON
ROTUNDA
INSULATING TAPES
Manufactured by
ROTUNDA LIMITED, DENTON, MANCHESTER



we don't produce the copper

but

—in the production of Oil-Filled Cable—as indeed of all types of cable—the Pirelli-General Cable Works is a *complete* manufacturing unit. Hot rolling of electrolytic copper "wirebars" to produce the ½" diameter rod required for cold wire drawing, is carried out entirely in the P-G Works. Further production line processes include de-scaling, drawing to all sizes and annealing in controlled atmospheres, before the soft bright copper wire becomes part of the conductor in a PIRELLI-GENERAL Oil-Filled Cable.

P G

33 kV to 330 kV

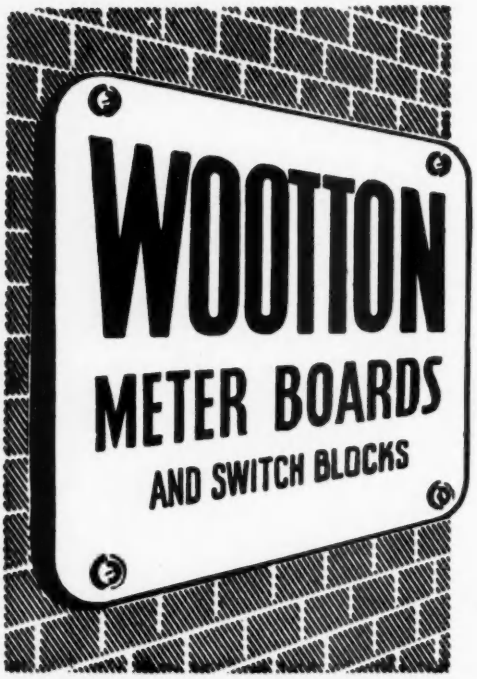
OIL-FILLED SUPER TENSION CABLE

PIRELLI-GENERAL *Cables*

MANUFACTURERS OF EVERY KIND OF ELECTRIC CABLE

PIRELLI—GENERAL CABLE WORKS LTD., SOUTHAMPTON

(Associated Company of The General Electric Co., Ltd.)



We have been making and supplying the Electrical Industry with METER BOARDS and Switch Blocks for over 27 years

- *FIRST CLASS WORK*
- *QUICK DELIVERIES*
- *COMPETITIVE PRICES*

We invite your enquiries

WOOTTON & CO., LTD.
ALMA WORKS, PONDERS END, MIDDX.
TELEPHONE: HOWARD 1858
L1048A

MAKING CONNECTIONS

CHINA CONNECTORS. 1, 2 and 3 way, 5 to 15 amps.
2-way centre hole, 5 to 15 amps. 1 and 2 way, 30 to 40 amps.

Pat. 438507.

Pat. 438507.

Pat. 438507.

MOULDED TERMINAL BLOCKS
1 to 12 way 5 to 40 amps
SCRUIT CONNECTORS: 4 Sizes Available
Please send 6d. for 92-page List OH/31/ET

METWAY ELECTRICAL INDUSTRIES LTD.
KING STREET, BRIGHTON 1
Phone: Brighton 28366. Grams: Metway, Phone, Brighton

Pat. 438507.

Let Crompton Street Lighting lighten his beat

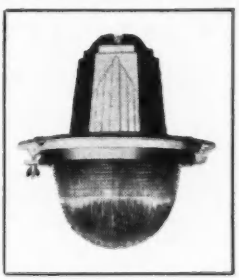
Reduce the toll of accident and crime on your streets by installing better street lighting. The new Crompton Street Lighting Lanterns which incorporate the latest design features ensure the best lighting with low maintenance costs.

Crompton Parkinson can also supply your requirements of Lamps, Control Gear, Time Switches, Steel and Concrete columns and other street lighting equipment and will undertake installation when required.

Our engineers are ready to advise you on any problem, without obligation. The Crompton Street Lighting Service is backed by over 70 years experience in electric lighting.

Write for details of these and other new Crompton Group 'B' road lanterns for use with Crompton lamps and control gear.

Crompton **'Sirius'** Bowl refractor Lantern for Group 'B' roads, for 80/125W mercury discharge or 80W fluorescent mercury lamps.



Crompton **'Taurus'** Bowl refractor Lantern for Group 'B' roads for 100/200W tungsten filament lamps.

SWITCH TO Crompton —LIGHT THE WAY

BY APPOINTMENT MANUFACTURERS OF ELECTRIC LAMPS TO H.M. THE KING

CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2
Telephone: CHAncery 3333

Available for **HEAVY DUTY**

ISENTHAL

'N.C.' AUTOMATIC REGULATOR

gives accurate, rapid and reliable control of

VOLTAGE · SPEED · CURRENT
POWER FACTOR

Compensation for parallel operation and/or over compounding readily provided.

of generators (and motors) of ALL SIZES (working singly or in parallel) under all conditions and in all circumstances; it is reliable even under "short circuit" conditions—thanks to simple and efficient anti-hunting features. No vibrating contacts—therefore no rating limitations. Control mechanism works under pressure oil, eliminating friction and wear. Automatically operated field rheostat is immediately available for hand regulation if required to meet special conditions.

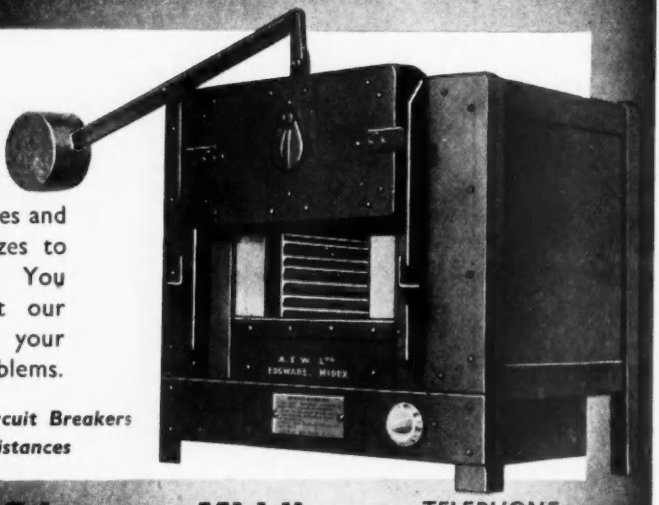
Full data gladly supplied upon request. May we investigate your special problems?

ISENTHAL & CO. LTD. Ducon Works, Victoria Road
NORTH ACTON, LONDON, W.3. *Telegrams: Isenthal, London. Telephone: ACOrn 3904*

AEW *Solve* **your Heat Treatment Problems**

by A.E.W.

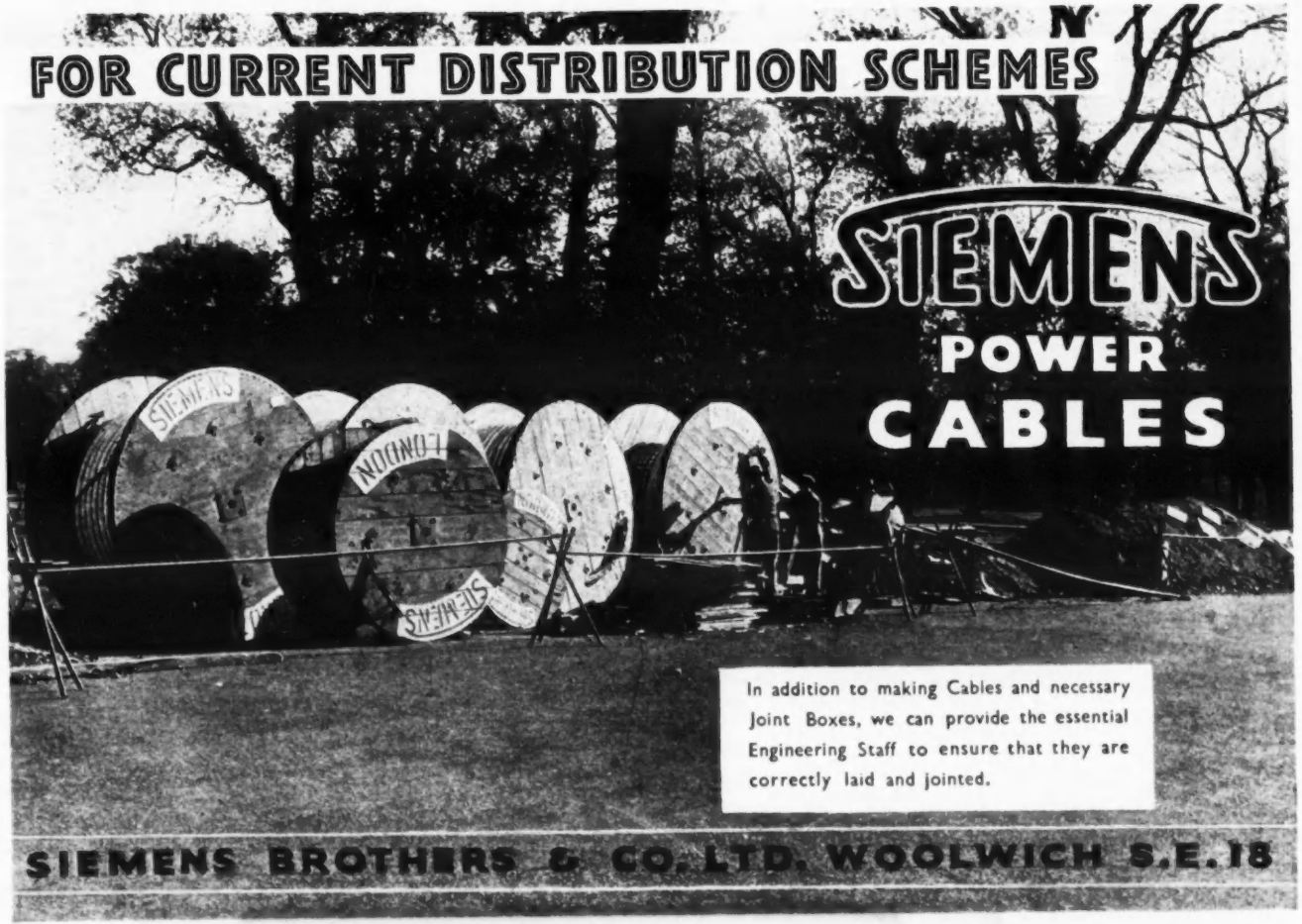
Electric Furnaces and Ovens



A.E.W. Electrical Furnaces and Ovens are built in sizes to suit all requirements. You are invited to consult our advisory service on your individual Heat problems.

Also manufacturers of Circuit Breakers and Wire-wound resistances

A.E.W. Ltd. Edgware, Middlesex *TELEPHONE: EDGware 0323/3975*


FOR CURRENT DISTRIBUTION SCHEMES
SIEMENS
POWER
CABLES
In addition to making Cables and necessary Joint Boxes, we can provide the essential Engineering Staff to ensure that they are correctly laid and jointed.
SIEMENS BROTHERS & CO. LTD. WOOLWICH S.E.18

HART ACCUMULATOR CO. LTD.,

Chequers Lane, Dagenham Dock, Essex

Manufacturers of

STORAGE BATTERIES FOR ELECTRIC LIGHTING AND POWER INSTALLATIONS

EMERGENCY LIGHTING EQUIPMENTS
for Hospitals, Cinemas, Theatres, Public Buildings, Hotels, Business Premises, Factories, Ships, etc.

PRICES ON APPLICATION

BY APPOINTMENT TO H.M. THE KING MAKERS OF ACCUMULATORS

Telephone: RAINHAM 34

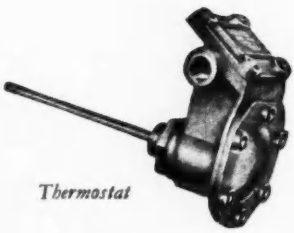
Branches at Birmingham, Bristol, Cork, Dublin, Glasgow, Manchester, Newcastle-on-Tyne, Nottingham, and Westminster.

"Dunlow" **ELECTRIC HEATERS**

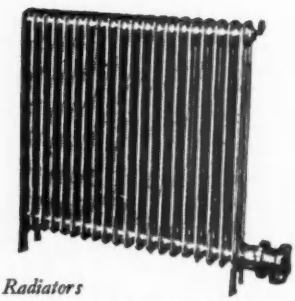
FLAME FLP PROOF

Immersion Heater

Certified by Mines Dept. Buxton



Thermostat



Radiators
1 *kw*, 1.5 *kw*, 2 *kw* & 3 *kw*

Duncan Low Ltd

290 BELL STREET · GLASGOW C4

Telephone: BELL 1961-2 *Telegrams:* "Immerser, Glasgow"

'ENGLISH ELECTRIC' ignitrons

Precision in Process Control

The Ignitron is designed for precision control of processes involving the use of comparatively low voltages and high currents—for example, resistance welding and X-Ray exposure control. It exhibits some important advantages over other methods; the ignitron combines the precision and freedom from mechanical problems of the thermionic valve with the robustness of the contactor; it is compact, moderate in weight and has a long life. 'English Electric' Ignitrons are made in a range of standard sizes, interchangeable with all other types in common use. They can be water-cooled and are suitable for line voltage of 250-600 volts.

THE ENGLISH ELECTRIC COMPANY LIMITED
QUEENS HOUSE, KINGSWAY, LONDON, W.C.2
Rectifier Sub-station Department, Stafford
Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

5★ FLUORESCENT LIGHTING *by* NEW ERA

★ TECHNICALLY DESIGNED
(as distinct from "happening")

★ GUARANTEED CONTROL GEAR

★ SUPERLATIVE FINISH

★ COMPARATIVELY LOW PRICES

★ GENEROUS TRADE DISCOUNTS

APPLY FOR COMPREHENSIVE CATALOGUE TO THE MANUFACTURERS

NEW ERA INDUSTRIES (TOTTENHAM) LTD.,
STONELEIGH ROAD, TOTTENHAM, N.17
Telephone: TOTtenham 5309 and 6536

Birmingham Office:
45 NEWHALL STREET, BIRMINGHAM, 3
Manager: L. Van Hagen, M.I.Ex., A.S.M.A.
Telephone: Central 1838 (two lines).

DEPENDABLE DOMESTIC ELECTRICAL APPLIANCES

COOKERS
DISH WASHING MACHINES
REFRIGERATORS
ARTIFICIAL SUN LAMPS
VIBRO MASSAGERS
PRESSURE COOKERS

A FEW OF THE MANY LINES WE STOCK

WE HANDLE HIGH-CLASS APPLIANCES ONLY

E·W·F ELECTRICAL WHOLESALERS FEDERATION MEMBER

OUR ADDRESSES:

LIVERPOOL 1-9 Stanley St.
MANCHESTER 3a Norfolk St. Pall Mall,
CARLISLE Paternoster Row
BIRKENHEAD 94 Chester St.
WORKINGTON Oxford Buildings Oxford Street

DOWNES & DAVIES LTD.

G.E.C.

MAIN ROAD *lighting* AT BOURNEMOUTH

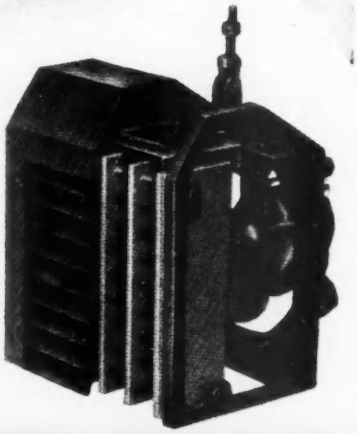
Boro. Engineer: W. L. Clowes, M.I.Mun.E.

This illustration shows the lighting installation at the Pier Approach, Bournemouth, where G.E.C. "Blown Glass cut-off" lanterns are used. Each lantern is equipped with a 250 watt OSRAM Mercury lamp burning horizontally.

UNIT HEATERS

Made in 3 sizes 3, 5 and 10 K...

- ALL ELECTRIC
- SIMPLE TO INSTAL
- ECONOMICAL TO RUN
- AUTOMATIC CONTROL
- REFRESHING ATMOSPHERE IN SUMMER
- AUGMENTS EXISTING HEATING SYSTEMS
- MINIMUM OF MAINTENANCE



SEND FOR LIST 57

CARTER & COMPANY (NELSON) LTD.

NELSON LANCASHIRE TELEPHONE · 638

CLEARLY—

A SOUND PROTECTION

'EVOLITE'

PERSPEX TUBES & CYLINDERS

Its good electrical properties make it the safe and economical choice for FLUORESCENT LIGHTING IN COAL MINES · DUSTPROOF AND CORROSIVE RESISTING FITTINGS, LAMP GLASSES, etc., etc.

RICHARD DALEMAN LTD.

325/327 Latimer Road - - London, W.10

Engineers in Perspex

USE "GUNFIRE" TRADE MARK

Time Switches AND Process Timers

FOR SATISFACTION

AUTOMATIC LIGHT CONTROLLING CO. LTD., BOURNEMOUTH

Established over Fifty Years.

FIRE!

WHERE'S YOUR

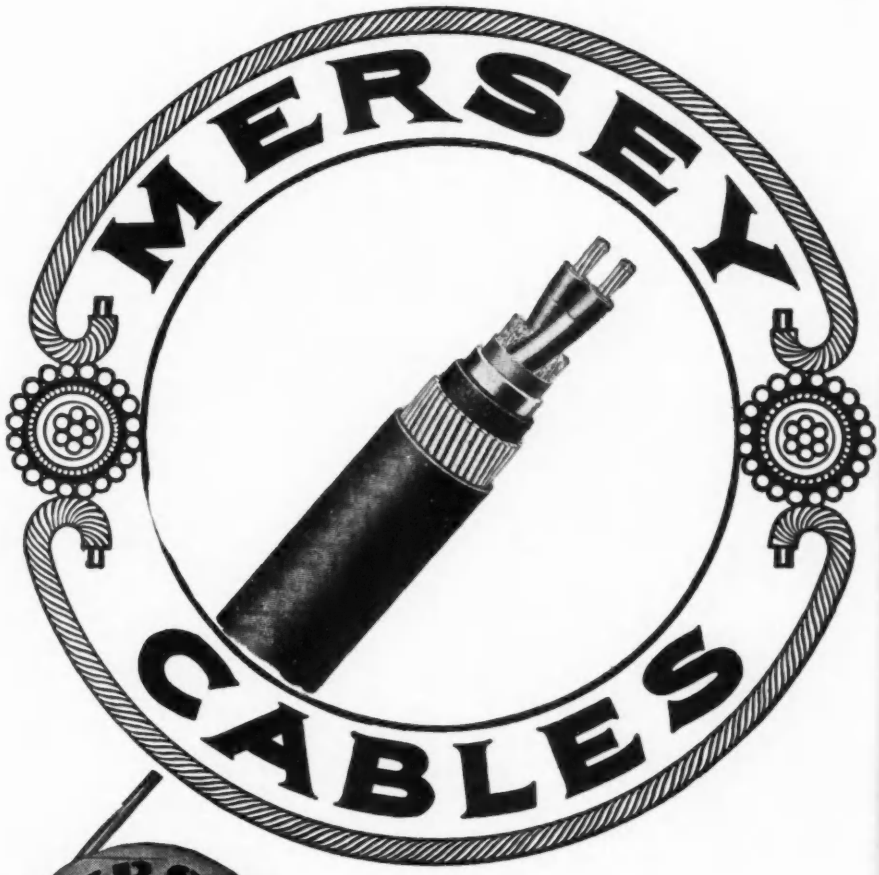
NU-SWIFT?

The World's Fastest Fire Extinguishers — for every Fire Risk

Pressure-operated by sealed C.O. Charges

NU-SWIFT LTD • ELLAND • YORKS

In Every Ship of the Royal Navy

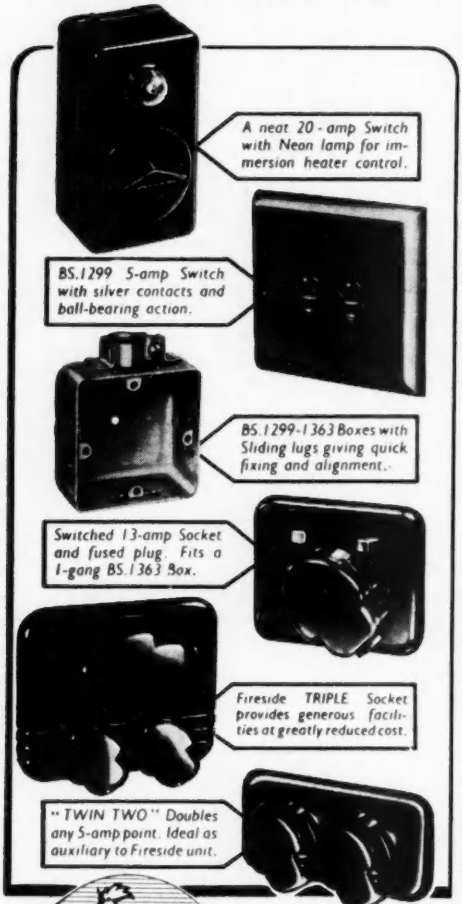


All Sizes of rubber insulated wires, cables and flexibles are made under the famous MERSEY name. *Illustrated is a 7/.036 Twin Circular V.I.R. Insulated, Taped, Lead Alloy Sheathed, Bedded, Single Wire Armoured, Jute Braided and Compounded 660 volt Grade Cable. To B.S. — No. 7/1946.*

MERSEY CABLE WORKS LTD., BOOTLE, LIVERPOOL. *Tel. BOOTLE 2777-8-9*

A (TI) COMPANY

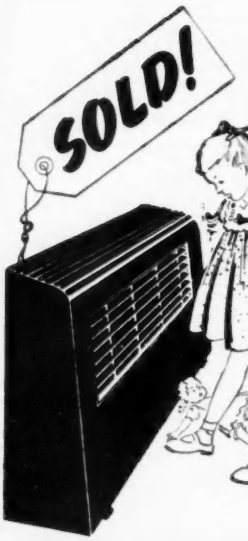
Off with the old— On with the NEW!


A neat 20-amp Switch with Neon lamp for immersion heater control.
BS.1299 5-amp Switch with silver contacts and ball-bearing action.
BS.1299-1363 Boxes with Sliding lugs giving quick fixing and alignment.
Switched 13-amp Socket and fused plug. Fits a 1-gang BS.1363 Box.
Fireside TRIPLE Socket provides generous facilities at greatly reduced cost.
"TWIN TWO" Doubles any 5-amp point. Ideal as auxiliary to Fireside unit.

NEW DAY

New Day accessories combine exceptional electrical and mechanical performance with valuable labour-saving features and a discreet styling which lends character to any domestic installation.

NEW DAY ELECTRICAL ACCESSORIES LTD
136-8 MARY STREET, BIRMINGHAM, 12



EFFICIENT 'ALL-ROUND' HEATING . . .

Thermovent's "all-round" heating virtues are so much in demand that supply is a hand-to-mouth affair; safe, economical *uniform* warmth without work or bother is just what the public ordered! However, we are doing our utmost to keep pace.

Thermovent

ELECTRIC SPACE HEATING
E. K. COLE LTD · 5 VIGO STREET · LONDON W.1

MORE— —THAN **FIFTY YEARS**

SPECIALISATION IN —
INSULATED ELECTRIC WIRES, CABLES & FLEXIBLE CORDS

The SAXONIA ELECTRICAL WIRE Co. Ltd
ROAN WORKS GREENWICH S.E.10
Phones Greenwich 0463 · 1672 ◆ Grams: Saxonist · London

P.V.C. Sleevings of Quality by — *Inter-Service Approval*

Plasticable Ltd

The Extruders

Hawley Lane, Farnborough, Hants

Telephone: Farnborough, Hants 85

ATLAS fluorescent unit for the home

1. Single rod suspension. Ceiling saddle and terminal block concealed by cover.
2. Four 2 ft. 40 watt lamps give direct and reflected light.
ATLAS GK/4240

PRICES

ATLAS GK/4240 Unit complete with control gear (excluding lamps) **£11 1s. 6d.** *Purchase Tax* **19s. 2d.**

Atlas 2 ft., 40 watt lamps (choice of five colours) Each **12s. 0d.** *Purchase Tax* **2s. 9d.**

Write at once for full details and attractive counter literature.

Although only recently introduced this ATLAS fitting has already received much favourable comment. Finished "Coinage Bronze" with opal "Perspex" diffuser, its appearance and proportions make it ideal for the larger room. Four 2 ft. 40 watt Atlas lamps (choice of five colours) give reflected and direct overall light, they can be changed in a few seconds.

ATLAS

FLUORESCENT

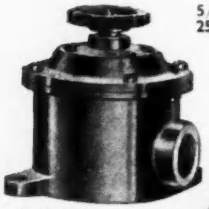
COMMERCIAL, INDUSTRIAL AND DOMESTIC

THORN ELECTRICAL INDUSTRIES, 105-109 JUDD STREET, LONDON, W.C.1

258

REGD TRADE MARK
NIPHAN

WEATHERPROOF METAL-CLAD PLUGS, SOCKETS SWITCH PLUGS, ETC.
for all electrical purposes

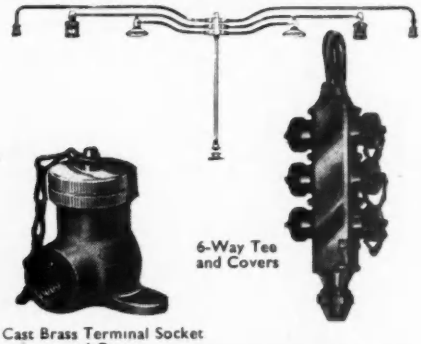

C.I. Switch

5/300 amp. 250/500 volt
Push-on Plug

Push-on Flange Socket with Spring Cover

Cast Brass Terminal Socket and Cover

Diagram for Temporary Lighting with Fittings connected to 6-Way Tee


6-Way Tee and Covers

Latest Catalogue on application

SIMMONDS & STOKES LIMITED
MANUFACTURING ELECTRICAL ENGINEERS
Victoria House, Southampton Row, London, W.C.1 · Holborn 8637 and 2163

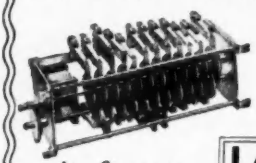
OVERSEAS AGENTS: *S. AFRICA, Hubert Davies & Co., Ltd., Johannesburg. NEW ZEALAND, Samuel Brown, Ltd., Wellington. INDIA, G.E.C. (India) Ltd., Calcutta. CEYLON, Walker & Greig, Ltd., Colombo.*

SKILLED HANDS REQUIRED!

Even the most highly trained hands are useless unless they are healthy hands—hands that are free from dermatitis.
Where hands have to handle industrial irritants — insulating varnish, shellac, transformer and lubricating oils—Rozalex acts as a barrier against skin troubles. Rozalex, applied very easily and unnoticeable when applied, has raised output in many a factory, not only by eliminating lost time and laid-off workers, but also by eliminating the fear of trouble among the workpeople. There is a type of Rozalex effective against almost every known industrial irritant. Our technical representative is at your service. Write to Rozalex Ltd., 10 Norfolk St., Manchester 2.

APPLY ROZALEX

SIGN-FLASHERS


MULTI-CAM TIMERS

Any Sequence or Spelling, etc.

LONDEX
MAKERS of RELAYS

Write for list 92/E.T.
Londex Ltd., Anerley Works, London, S.E.20. SYD 6258-9

WIREOHMS, LTD
NOTTINGHAM
Makers of
ALL TYPES OF ELECTRIC ELEMENTS
SOLE WORLD DISTRIBUTORS:
H. J. BALDWIN & CO., LTD.
Baldwin House · Nottingham

J. & P. ALUMINIUM SHEATHED CABLES

It is surprising what a difference the reduction in weight makes both when transporting and when installing aluminium sheathed cables. But then, 20% to 70% is a considerable reduction. If it is used unarmoured, as it frequently can be, the saving in weight is even greater—as is the financial saving.

British Patent Nos. 627815 *&* 627793.

JOHNSON & PHILLIPS LTD.
CHARLTON LONDON S.E.7
The mark that means that "little more" in quality

AC/DC
200-250 VOLTS
or
100-125 VOLTS

World patents pending

THE 'LAMMIX' IS THE NEWEST AND THE MOST WONDERFUL OF KITCHEN MACHINES

SEE the Lammix at work and realise why it is unique among kitchen machines. Demonstrations to retailers and to the public can be arranged. Apply to address below for full particulars.

THE MULTI-PURPOSE
Lammix
KITCHEN HELPER

AT A TOUCH OF A SWITCH, IT MIXES · MINCES · BEATS WHISKS · KNEADS · GRATES SLICES · MAKES SAUSAGES EXTRACTS JUICE · ETC.

THE LAMMIX IS EASY TO ASSEMBLE · EASY TO WORK · EASY TO CLEAN

Manufacturers; Huwood Components Limited, St. Peters, Newcastle-upon-Tyne, 6.

VARNISHED SLEEVINGS IN COTTON, SILK AND GLASS

INSULATING MATERIALS

LAMINATED BAKELITE TUBES AND FORMERS

W. H. GRIMMER
50, BOW LANE, CHEAPSIDE, LONDON, E.C.4.
CITY 1791/2 CABLES—CHARTIMER LONDON

THE NATIONAL FIRE PROTECTION CO., LTD.
Specialists in the protection of motors, switchgear, etc. against
FIRE
Write for free copy of our Electrical Brochure EB.ET.
ESSEX WORKS, FAGGS RD., FELTHAM, MIDDX.
Branches: Birmingham, Leeds, Glasgow, Belfast

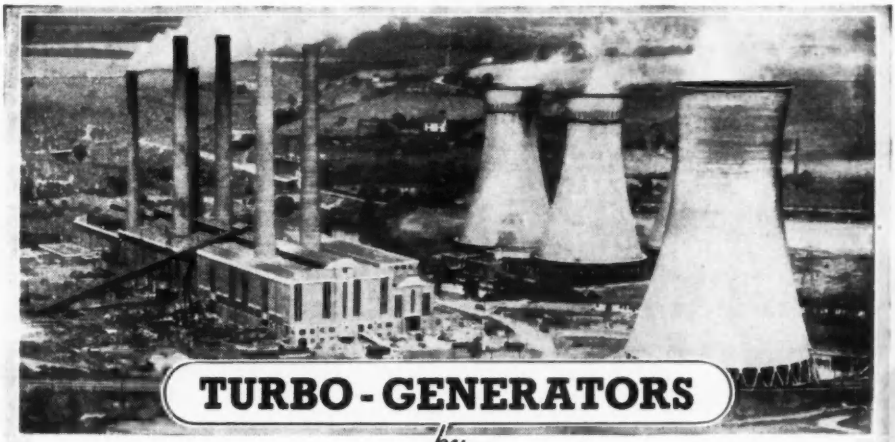
ECHO TESTER

New electronic type instantl detects faults in Armatures, Stators, Fields and other Coil Windings. A.C. or D.C.
Send for interesting leaflet 26 D
RUNBAKEN · MANCHESTER 1

First Class Quality Cables

WANDLESIDE CABLE WORKS LTD.
106 GARRATT LANE
WANDSWORTH, LONDON, S.W.18
V.I.R., T.R.S., LEAD-COVERED

WANDLE CABLE · BRITISH MADE
WANDLE FLEX · BRITISH MADE



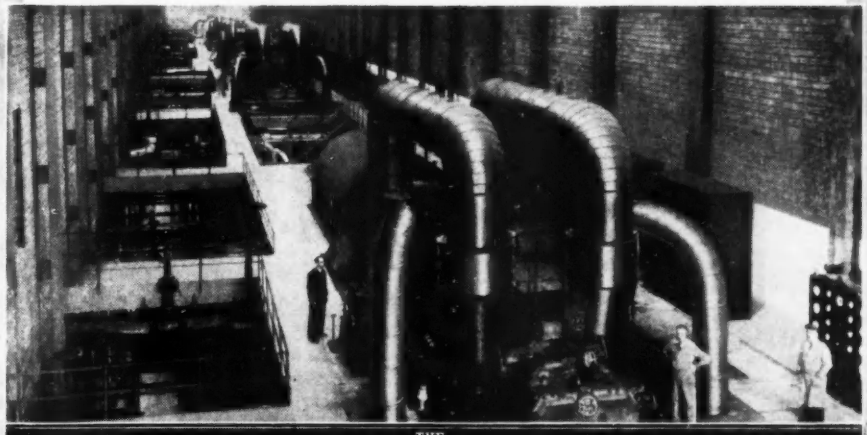
TURBO-GENERATORS

by

B T-H

Power-stations throughout the world are equipped with steam turbines and generators made by BTH, who hold a leading position as designers and manufacturers of some of the largest machines installed - or building.

At the Kearsley Station of the British Electricity Authority seven BTH turbo-alternators, ranging in size from 535 kVA., (emergency set) to 75,000 kVA., will provide a generating capacity of 394,293 kVA.



THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED, RUGBY, ENGLAND

Member of the AEI group of companies

A 4190

ESTABLISHED 1840

ATTWATER & SONS

HOPWOOD STREET MILLS,
PRESTON.

MICA & MICANITE

IN ALL FORMS & QUALITIES.

BAKELITE SHEETS · TUBES · BOBBINS · VARNISH AND ROSIN
FOR OIL SWITCH GEAR & TRANSFORMERS

VULCANISED FIBRE SHEETS, TUBES AND RODS.

PEERLESS **LEATHEROID** INSULATION.

BAKELAQUE INSULATION
WHILE I LIVE I'LL CROW
BEST TRADE MARK
BEST BRITISH MANUFACTURE

Cotton and also Asbestos Dynamo Tapes.

Presspahn and Fullerboard In Sheets and Rolls.

Empire Cloth and Tapes

Ebonite and all Insulating Material for Electrical Engineers.

SINGLE POLE AND NEUTRAL GEAR

by

SANDERS
WEDNESBURY

ALL-INSULATED SWITCH FUSE
WITH 15 AMP. FUSE
LIST NO. N.101G.
CONSOLIDATED LIST PRICE : 9/1 EACH

For new and used machine tools . . . power presses . . . sheet metal working and woodworking machinery, etc. . . . **F. J. EDWARDS, LIMITED**, 359-61, *Euston Road, London, N.W.1. Tel: Euston 4681-3771. 'Grams: Bescotools Norwest London*

INSTRUCTION CHART
For dealing with apparent death from
ELECTRIC SHOCK
(In accordance with H.O. Electy. Reg. 29)
Mounted on strong board, varnished and corded for hanging
Price 3/- plus 10d. postage (per single copy)
ELECTRICAL TIMES
Sardinia House, Sardinia St., LONDON, W.C.2

ELECTRIC MOTORS

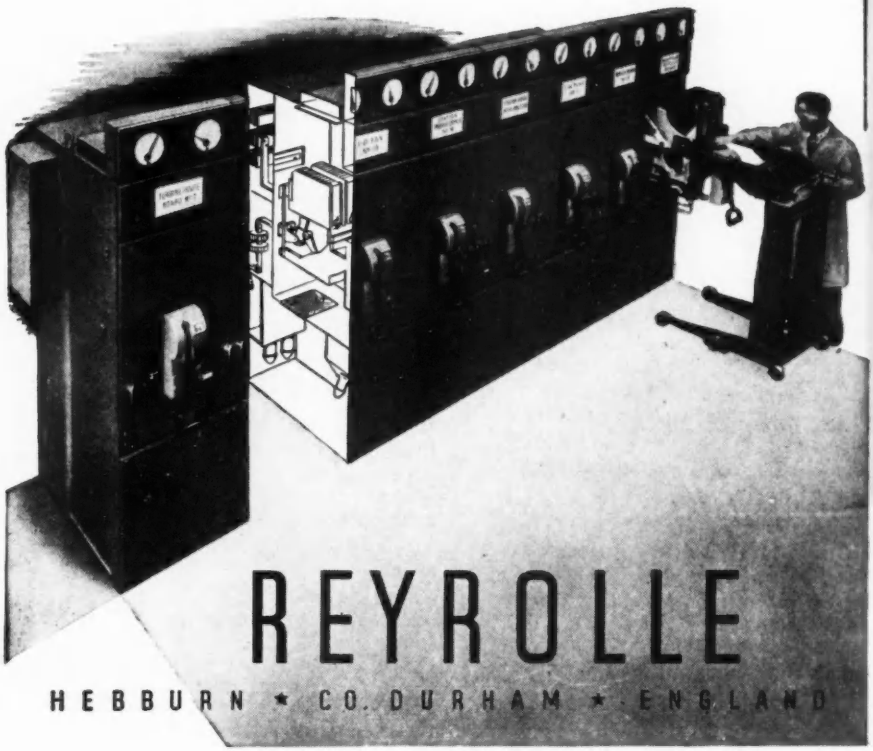
Fractional — 50 H.P.
Repaired and Rewound

WALTER CRANE
GREENCOAT WORKS, WAKEFIELD

AIR-BREAK

CLASS-SA SWITCHGEAR

★ Air-insulated
★ Metal-enclosed
★ Medium-voltage
★ 800, 1200, 1600 and 2400 Amperes



REYROLLE

HEBBURN ★ CO. DURHAM ★ ENGLAND

The Scene . . . . . The Underground

The Time . . . . . A Winter Evening

The Woman . . . . . A Fashion Buyer

The Story . . . . . One of a crowd on the homeward trek, in search of relaxation, comfort and warmth

The Moral . . . . . **She needs a Magicoal Fire**

Overseas enquiries to
Berrys Electric Ltd.,
Newman St., London, W.1.

Berry's
ELECTRIC MAGICOAL FIRES

Printed in England for the Proprietors, THE ELECTRICAL TIMES, LTD., by SUN PRINTERS, LTD., London and Watford, Herts., and published at Sardinia House, Sardinia Street, London, W.C.2. February 15, 1951.

Aeroflex Ceram HOPE'S PATENTS Fuses *in* RADOK CONTACTS

1.25 FUSING FACTOR
25 M.V.A. BREAKING CAPACITY

200 • 400 • 600 • 1000 AMPS, 440 V

Complying with BS 88 1947 Class P, Radok Fuse Units are fully shrouded and thus meet the requirements of the Factory Acts. They embody the new compact and economical Aeroflex Ceram Fuse Links, which have multiple elements, and afford the valuable characteristics of rewireability and low fusing factor in sizes up to 1000 amps.

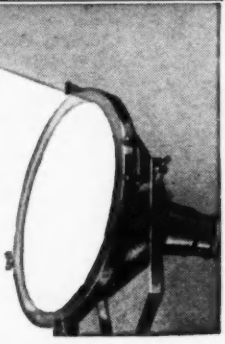
REWIREABLE ★

The contacts comprised in the Radok Fuse Unit afford perfect electrical continuity with a practically immeasurably low voltage drop, yet only firm finger pressure is necessary, the design causing a powerful leverage to be exerted against the fuse blades. Copies of list RU/1 are available on request.

PARMITER HOPE & SUGDEN LIMITED
FLUVENT ELECTRICAL WORKS, LONGSIGHT, MANCHESTER 12
London: 34 Victoria Street, S.W.1. *Glasgow: 162 Buchanan Street, C.1*

dm PH 40

GOVERNMENT departments, municipalities, public bodies and business houses all over the country are entrusting their Festival floodlighting to BTH, the acknowledged leaders in lighting. You may secure free advice and guidance on every aspect of decorative, display and floodlighting by consulting your local BTH Office.



Illustrated here is MAZDA Floodlight Projector '21'. Scientifically designed and sturdily made to give maximum service with minimum maintenance. Many other designs are available. Ask your local BTH Office for details.

MAZDA the outshining light

MAZDA LAMPS AND LIGHTING EQUIPMENT

The British Thomson-Houston Co. Ltd., London, W.C.2 *Members of the A.E.I. Group of Companies*

M 4303